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THE AUTOMOBILE

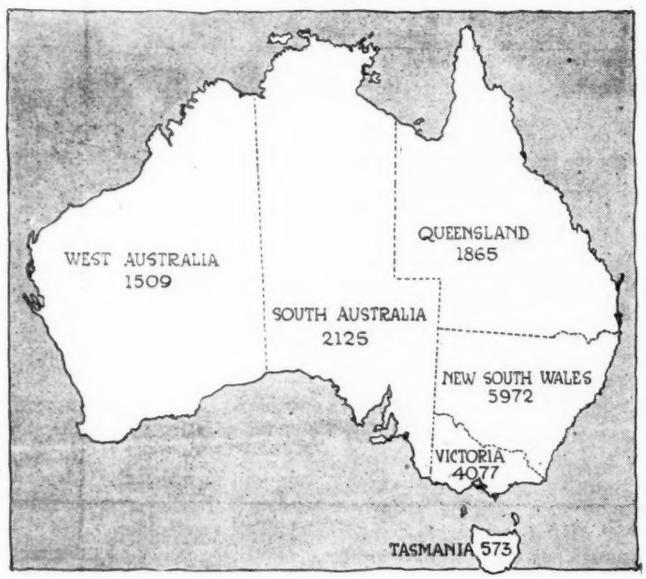
Progress of the Automobile Industry in Australian States

Although Comparatively a New Continent and as Yet Largely Undeveloped, Australia Has 16,000 Cars

American Automobiles Already in the Lead and Rapidly Coming Into Greater Favor—American Cars Average 20-25 Horsepower While European Are Only 12-15

TO supplement the statistical information on the automobile industry of the United States and elsewhere already published, THE AUTOMOBILE has obtained figures showing its progress in Australia. Here is a vast continent, 2,974,581 square miles in area, with a population of 4,275,000 and furnishing great opportunities for the automobile exporter who can convincingly demonstrate the value of his wares.

Many makers, chiefly European, realized the possibilities presented by this territory a few years ago and, having started early, are today reaping deserved benefits. The American manufacturer was too busy at that period with his own domestic trade to afford time for much export development. But with the growth of immense factories and standardized output these conditions are rapidly changing and at the present day the agencies of the various American automobiles established in Australia are doing an excellent business. An American car, in fact, heads the list of sales in all five divisions, or states, the Ford having a total of 900 in use throughout the continent. Second to this car stands an English product, the Talbot, with 700.

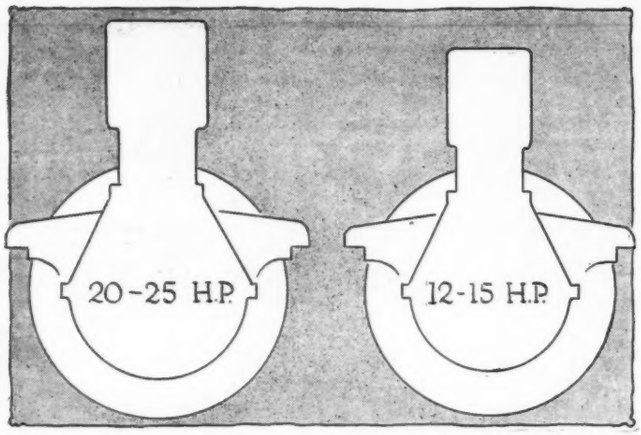


Map of Australia, showing distribution of automobiles in the various states

Australia is divided into five states, namely, New South Wales, Victoria, Queensland, South Australia, West Australia and the Island of Tasmania. The number of cars registered in each of these states may be seen on the map at the head of this article, while the table on page 872 gives the actual number of the various makes for each state registered up to May 31, 1912. At this date the total for the entire continent was 16,123 cars. This figure includes about 300 commercial vehicles, besides the taxicabs plying for hire in Melbourne. The taxicabs of New South Wales, amounting to about 200, chiefly Napiers, are not included, their registration being separate, whereas in Melbourne the licensed vehicle is registered in the same class as the pleasure car.

Special conditions prevail in Australia and it is possible that these may have caused some hesitation on the part of the exporter, but in this respect the American has the advantage over the European maker, owing to his experience and knowledge of requirements in the West and Canada, where the special needs are more or less closely allied to those obtaining in Australia. The establishment of agencies and provision for the supply of spare parts in wide territory are more familiar and experience has demonstrated their great importance.

A comparison between Canada and Australia is interesting The former has a population of 7,000,000 and has registered 22,000 automobiles, roughly speaking, three automobiles to every thousand of the population. Australia, with a population of just over 4,000,000, has a total of over 16,000 automobiles, which works out on a scale of nearly four cars to each thousand of population.



In Australia the American car averages 20-25 horsepower and the European car 12-15

Comparing the conditions in Australia on the mere basis of cars per population brings out the fact that in West Australia, where there is a car to every 182 people, the ratio between the number of machines and inhabitants is practically the same as in Texas, while the minimum ratio, one car to each 332 inhabitants in Tasmania, ranges between the respective registration figures up to July 1, 1912 for the states of Tennessee and Oklahoma.

An interesting difference between American and Australian statistics is brought out by the ratio of pleasure and commercial vehicles. In the United States there were, on July 1, 1912, some 860,000 cars including 31,600 commercials; while Australia has 300 truck among her 16,123 cars, or one truck to every fifty-four pleasure cars, while in the United States there is a truck to every twenty-seven pleasure vehicles. If, however, the taxicabs used in New South Wales are included among the trucks, the ratio for Australia is one truck to thirty pleasure cars, in other words, very close to that of the States.

The number of automobiles per capita in all the Australian states is shown in the table appearing on page 873. The highest number of cars for every 1,000 inhabitants, that is 5.5, obtains in West Australia, while three cars for every 1,000 of the population holds for both Victoria and Tasmania, the rest of the states ranging between these two limits. The ratios between automobiles and the areas upon which they are distributed are as follows. There is one automobile to every 21 square miles in Tasmania, to every 46 in Victoria, to every 358 in Queensland, to every 425 in South Australia, 520 in New South Wales and to every 646 square miles in West Australia. The maximum ratio for cars per capita goes hand in hand with the minimum ratio of cars per area. This however, is accounted for by the difference in the size of the territories and in the density of their population, rather than by the difference of topographical conditions. Western and South Australia are to a great extent favorable ground, so far as the formation of the same is concerned, while the two smaller states are mountainous. The high ratio of cars per capita is South and Western Australia also seem to indicate that these states are excellent selling ground for automobiles.

The peculiar character of the Australian continent is, if anything, favorable for the introduction of automobiles. Think of a space of almost 3,000,000 square miles, with a coast line 8,800 miles in length, which has only 2,345 miles of navigable rivers. Consider further that what mountainous territory there is in Australia extends parallel with the coast, while the interior of the country is practically one great plateau, excepting one group of mountains in the center of the continent and surrounded by a sandy desert 500,000 square miles in area. Leaving these arid stretches of land out of consideration, there are surfaces many hundreds of miles in size on which settlement has just about begun. In these places, as road building progresses, the automobile has a chance of sharing the business with railroads that are to come. It might even be hinted that nothing but good roads are lacking to make this land a splendid territory for automobiles.

The fact that Australia has a dry climate almost throughout calls for as little use of wood as possible, and for a prolific application of metal in wheels, body, etc. At the same time this end should be realized without undue increase of weight.

Coming to the question of prosperity of this territory, it should be remembered that the agricultural, pastural and timber industries of the five states yield about $3,500,000,000 a year. This leaves fisheries, mining and fuel production, which also are increasing every year. Then, taking all this in consideration, there is a population approximately equal to that of New York City, including one-twentieth who are aborigines, and who uses one-third the number of cars used today in the American Metropolis. This alone should suffice to illustrate the excellent possibilities of an export field which has "just been scratched." But in addition to all this comes a huge and ever increasing commerce, and as the buying public is practically concentrated along the coasts the conditions which permitted of introducing 16,000 cars within a very few years must of necessity be very favorable to the automobile industry.

As is stated in another portion of this article, Australian conditions resemble somewhat those existing in Canada and in the West. This permits of drawing the conclusion that cars should be just high-powered enough to give pleasure to the average driving owner, while excessive power would be a sheer waste of investment and upkeep, due to the prohibitive stand taken by authorities against speeding. Where speed regulations do not exist, the possibilities for speeding are generally absent as well.

LEADING MAKES OF CARS IN AUSTRALIA

Make of Car	New South Wales	Victoria	South Australia	Tasmania
Ford	324	309	196	70
Renault	256	224	37	17
Talbot (English)	251	259	164	25
Overland	107	71	19	23
DeDion	152	255	178	22
Hupmobile	140	21	4	35
Cadillac	85	12	5	8
Daimler (English)	130	105	14	12
Humber (English)	125	103	85	17
Fiat	127	93	7	12
Star (English)	201	...	91	..
Flanders	26	40	75	9
E.M.F.	15	29	13	..
Rolls-Royce (English)	12	19	4	..
Regal	21	14	14	4
Austin (English)	70	85	9	16
F.N.	110	91	...	..
Chalmers	51	15	...	1
Napier (English)	48	36	18	17
Buick	42	7	5	1

Simplicity, strength and accessibilty are three points which cannot fail to attract the Australian purchaser. Cars going to that far territory should be trouble-proof if not fool-proof, for their care will in many cases depend upon men other than mechanics and in a locality remote from such men skilled in the art of handling automobiles.

It will be noticed in the tables that the sales in Australia lie in the direction of the small car. The large, expensively-equipped car is not seen in great numbers. Whether this can be attributed solely to demand cannot be definitely stated, but the more active salesmanship in the small car field may be a factor of more importance than would at first be supposed. The average horsepower of the American car is considerably in excess of that supplied in the cars exported by European manufacturers, the figures being respectively 20-25 and 12-15 horsepower.

Looking over the accompanying table which shows the various cars and their relative numbers as represented in the several Australian states, reveals the interesting fact that the Ford product is fully 200 cars ahead of any other make. While it might not seem reasonable to draw general conclusions from this specific instance, its importance must nevertheless not be

overlooked. In addition to the delivery of a fair amount of power, this make of automobile has three points in its favor which admittedly are of great significance in Australian automobiling: These advantages are: (1) light weight and proportionately high power; (2) ample ground clearance; (3) low price, and actual cheapness, that is, good value in proportion to the retail price.

There is hardly any need to argue on the importance of the first point. Light weight means direct economy on tires as well as gasoline. In a country where all tires are imported as ready products, over distances of thousands of miles, the prices of these products are necessarily high, and conditions relating to gasoline are somewhat akin, although Borneo represents a near point of supply. Thus the light weight is in direct proportion to the upkeep of the car, and it goes without saying that in a young country, such as Australia is, when one looks at the commercial side of the matter, money is one of the most precious commodities.

As to ample ground clearance, this appears to be a necessary provision in a car lest trouble is to be courted deliberately. Good roads, though they make progress, are but in their infancy in Oceania, and sufficient clearance is doubly significant on this account as well as because of the necessity of getting down under the car for inspection and repair work.

The point of cheapness has been touched upon before, and its importance is borne out by the table showing the distribution of various products in the various territories. The fact that Renault cars rank second after Fords in number is probably due to the early introduction of this product and the energetic pushing of its business once a momentum had been obtained. Otherwise the difference between the numbers of this

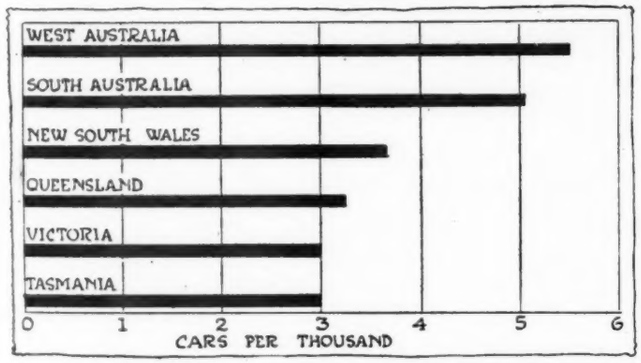


Chart showing relative numbers of automobiles to each thousand of the population in the Australian states

make and, for instance, that of Fiat cars, could not be explained.

Speaking of the advantages of American construction, the accessibility of parts, especially the engine, contrasts favorably with that in the average British design, and, while the amplitude of the power output seems to satisfy male buyers, the weaker sex takes great delight in using our machines on account of the easy riding given by the well-tempered springs. Flat, long springs are looked upon as the most suitable pattern for Australia. To elaborate on the benefit of complete equipment is, of course, unnecessary in these columns. Australians appreciate comfort fully as much as we do.

But, on the other hand, several points in which British cars are superior to ours should be kept in mind. Perhaps the most important among these is the question of wheels. Wooden wheels are short-lived in the dry climate of the interior country and therefore advisable only for use near the coasts. Wire wheels, while they are free from this defect, clog up easily where the cars operate in so-called black soil. The logical solution would be the introduction of a metal wheel different from the wire design, which latter does not permit of protecting the spokes against the soil. Next to this disadvantage comes the alleged weakness of the average rear axle on cheap cars. Australian users claiming frequently that after using the car a short time this member proves not strong enough to stand up under the severe strains which have their cause in the peculiar topography of the country.

In both advertising and methods of salesmanship there is still a good deal to be learned in the Australian automobile field. Sydney, New South Wales, can show some fine and costly garages and salesrooms, but, for the most part, both there and in Melbourne, Victoria, another main center of distribution, the garages are adaptions of old buildings, often quite unsuitable for the purpose. The lighting is generally inadequate and, as a result, it is common practice to run the prospective buyer out into a neighboring park in order to obtain the necessary light for inspection purposes. In Melbourne there is the further disadvantage that the agencies are not centered in any one part of the city, but are scattered. This is a condition of things which will doubtless improve as the sales advance.

The Australian dealer does not seem to make enough use of the capabilities of a car as selling points, but generally refers the buyer to some user who is getting satisfaction in the use of a similar car. This is a perfectly sound line of selling argument, but it need not be the only one.

A serious handicap under which the dealer in Australia labors is the illegality of speed contests. Public interest is therefore difficult to attract, except through the ordinary channels of advertisement. Such tests as the Glidden Tour or club reliability tours are unknown. Now and then there is a hill-climb or a fuel consumption test, but, from the dealer's point of view, these are of little use, for the contests are open only to members of the automobile clubs, which are run on rather conservative lines. Members of the trade, for instance, are not allowed to compete except under the loss of points by penalty as they are considered as professional drivers.

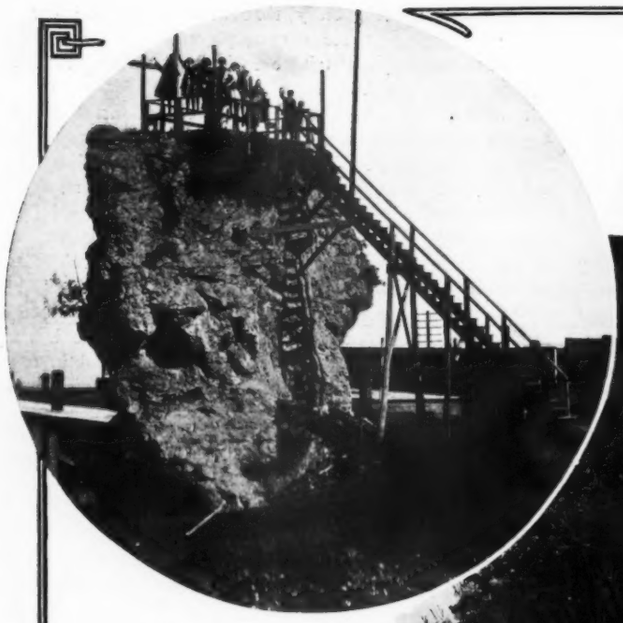
Another fact brought out by the table showing the comparative number of cars of different makes in use in Australia would seem to be the importance of the personal equation as represented by the personal energy of the salesman or agent. No other cause could be given for the difference in number of Ford cars and other low-priced American automobiles. Leaving other things out of consideration, the establishment of an Australian trade for American cars becomes a question of selecting a capable, hustling importer in that territory. There is no more potent means of inducing an agent to make good sales than to insure to him a fair portion of the selling profit. Thanks to our manufacturing conditions, it is easy for the majority of makers to sell their product at a very fair profit to themselves and to the agent, and still sell somewhat below the figure set by the selling representatives of the various European makes of cars. It is due to this fact that some Australian agents who handle two or three European or British makes, as well as a cheap American car, make more money out of the latter than out of all the others combined.

Furthermore, territories are often too extensive to be covered by one man, and in order to do efficient work the importer has to appoint agents or sub-agents which form the connecting link between him and the ultimate purchaser. For this reason, relatively liberal commissions for importer are indispensable if an American manufacturer seeks to introduce his product in Australia.

TABLE SHOWING AREA, POPULATION, NUMBER OF AUTOMOBILES AND RATIO OF CARS TO POPULATION IN AUSTRALIA

State	Area in Square Miles	Population	Automobiles Registered	Population per Automobile	Automobiles per 1000
West Australia.....	975,876	275,000	1509	182	5.5
South Australia.....	903,690	420,000	2125	198	5.06
New South Wales....	310,000	1,630,000	5972	273	3.68
Queensland.....	670,500	575,000	1865	308	3.25
Victoria.....	87,884	1,350,000	4077	330	3.
Tasmania.....	26,215	190,000	573	332	3.

Circling Lake Michigan



Circle

Tourists at St. Ignace, showing peculiar rock

Top

Chicago tourists on muddy road up Rapid River

Side

Robbins' Abbott car driving through deep mud

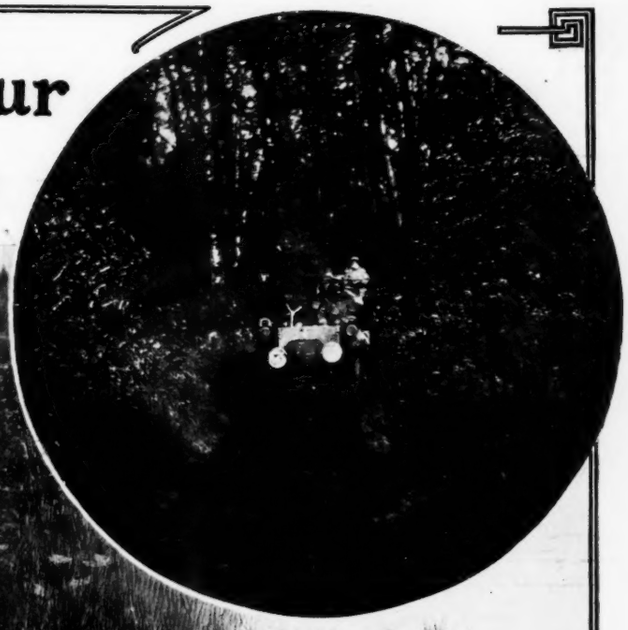
Corner

An abandoned lumber camp on the route near Newberry, Mich.

Bottom

Press car receives assistance on new sand hill

Chicago's Tour In Photograph



Circle

Part of the way lay through dense forests over mere trails

Top

Starter Kavanagh in R. C. H. between Newberry and St. Ignace

Side

Brolley's Velie and one of the R. C. H. cars on a rutty road

Corner

Map of Lake Michigan, showing the route followed by the tour

Bottom

Taylor stopping his R. C. H. for water on a bridge at St. Ignace

United States Motor Company Financed by Order of the Court

While Receivers Recommend Scrapping Plants Except Maxwell-Briscoe, Flanders Investigates Property Pending Merger

Court Grants Receivers Permission to Issue $1,500,000 in Certificates to Finance Maxwell Company's 1913 Schedule and Sets Discussion of Decree of Sale of U. S. Motors for November 11

STATUS OF U. S. MOTOR COMPANY

Court orders deposits returned to dealers; provides for settlement of claims that arose between extension and receivership, in all $133,000.

Receivers recommend that all plants be closed down except Maxwell trio and ask permission to issue $1,500,000 of receivers' certificates to finance manufacturing schedule of 1913.

Certificates are a lien on all property but must be applied first to other assets than those of the Maxwell plants.

Application for a general demurrer to the jurisdiction of the court is filed on behalf of Frederick D. Bond, acting for some minority stockholders.

Walter E. Flanders and the United States Motor Company are making examinations of each others' properties in contemplation of a merger when the court tangle is settled.

Court orders decree of sale to be prepared as to form and provides for discussion of the decree November 11.

ROBERTS Walker and W. E. S. Strong, receivers of the United States Motor Company, presented their report to Judge Charles M. Hough, of the United States District Court on Monday, recommending that manufacturing of automobiles be abandoned in all the plants of the company except the three belonging to the Maxwell-Briscoe Motor Company and that the court should give permission for the issuance of a maximum sum of $1,500,000 of receivers' certificates to finance the beginning of the Maxwell 1913 activities.

Not a word was said officially concerning any reorganization and as far as surface indications go, all parties in interest contemplate proceeding toward a sale as the culmination of the present suit in equity which was instituted by the Brown & Sharpe Manufacturing Company.

Mr. Walker read the receivers' report, which was very voluminous, covering forty pages of closely written manuscript. The report described in detail the physical and financial condition of all the properties of the United States Motor Company as outlined in the accompanying balance sheet.

The recommendations of the receivers, so far as finance is concerned, were included in the following list:

To provide for the liquidation of selling companies and the full payment of the local creditors of such selling companies and of the dealers who dealt with such selling companies, where deemed advisable by the receivers.

The indebtedness to local creditors of the selling companies referred to amount to about $140,000 after setting off certain credits. The amount owing to dealers who did business with the selling companies is in the neighborhood of $120,000 net. In all, permission to pay $260,000 net was asked by the receivers on account of the selling companies. It was indicated that such a move would be good business for the embarrassed company because of the valuable assets that would be added to the estate after settlement of the scattered debts of the selling companies; that it would serve to continue the good will, an intangible but valuable element in the situation and that in case of continuance of the business it would make a favorable sale easier than if the usual outlet for manufactured product was eliminated.

The second recommendation was for payment in full to the dealers who made deposits with the United States Motor Company.

It was shown that the company held about $63,000 of such deposits and that just prior to the receivership a virtual trust fund was deposited by the company in the Central Trust Company to provide for the protection of the dealers. The court was asked to construe this fund as a trust fund for the benefit of the dealers. It was also shown that there were certain credits of the company that should be charged against this fund, making the total net amount due the dealers about $29,000. This would leave a credit of about $33,000 for the estate.

The third recommendation was for payment in such manner as may be ordered by this court to creditors who shipped goods or furnished materials or services to the company just prior to the receivership.

In this regard it was shown that claims for about $100,000 had accrued between the time certain materials were shipped to the company or services rendered the company and the appointment of the receivers.

Under the working agreement of the creditors as outlined in their letter of June 18, it was provided that all current indebtednesses of the company should be paid in cash upon delivery. The amount covered by the class of claims included in the recommendation represents materials and services contracted for under the creditors' agreement, that fell due after the recivers took possession. They could not be paid by the receivers without permission of the court.

The fourth recommendation was for continuance of the business. The receivers reported that the Alden-Sampson and Brush companies were closed down except for sufficient activity to maintain the supply of spare parts likely to be required by the cars in service. The Columbia is completing its manufacturing schedule and the receivers recommend that the plant be closed down as soon as the few remaining cars are finished, except that a certain amount of work should be done in the manufacture of spare parts for automobiles in service. The Courier Car Company was pronounced moribund and it was recommended that it remain so for the present. The Dayton Motor Car Company was reported to be finishing its manufacturing schedule for 1912 and it was recommended that the plant be closed down as soon as the present work is ended except for the making of spare parts

and repair supplies. As far as the three Maxwell factories are concerned, the receivers recommend that they be closed down also, by or before December 15 unless provision can be made to finance the 1913 campaign.

In this particular it was shown that the United States Motor Company had on hand about $500,000 and sufficient quick assets, over and above the amounts asked in the first three recommendations, to make up about $800,000. That sum with $1,500,000 to be raised by the issuance of receivers' certificates at par, based upon all the assets of the corporation, would in the opinion of the receivers be sufficient to make a good start on manufacturing for 1913 and enough to carry the operations of the company for 3 months.

It was pointed out that the element of time is the vital one in the situation and that even with the utmost celerity it will be necessary to proceed at high pressure in order to retrieve the fortunes of the company.

James N. Rosenberg, attorney for the receivers, explained with much clarity to the court that unless a manufacturing schedule was framed and material progress made at once, the effort would prove futile. He said that it was imperatively necessary that there be a volume of cars ready for market in April and May and a fair supply in March and a few in February. This he said would be impossible to accomplish unless work was begun practically instanter.

The alternative, he pointed out, was that the plants must be closed down and scrapped along with the rest of the properties.

The fifth recommendation was that the court should give such directions as it saw fit respecting the sale of any of the properties or assets.

Objection was made by Judge Bisbee on behalf of the Maxwell-Briscoe creditors to the fourth recommendation as outlined by the receivers. Judge Bisbee stated that the Maxwell company was the only solvent concern of the U. S. Motors and that at a sale as scrap, the property would realize enough to pay its debts. He stated that it would work a substantial injustice to his clients in case the recommendation for the issuance of receivers' certificates should be approved, if the operation so financed developed into a failure. He said that the Maxwell creditors could be paid off at forced sale and that there was an element of chance unjustified involved in case of continuance, where the only solvent company would have to bear the brunt of the risk.

Judge Hough rather leaned toward Judge Bisbee's presentation and for a time it seemed as if a period would be placed to the affairs of U. S. Motors.

After recess Judge Hough took up the question and settled the matter by approving the recommendation of the receivers, but ordering that the lien of the receivers' certificates should be first borne by other companies than the Maxwell and that if, in case of liquidation under the certificates, the properties of the Maxwell company should be applied only to the payment of any balance that might remain after all the other assets had been used to satisfy the liquidation.

While the recommendations of the receivers were approved broadly by the court, the whole tense situation is still under high pressure. Under the order the manufacturing schedule of the Maxwell company will be commenced and in case of a sale the company would have a colorable claim to being a going concern and not scrap. But there are still two hurdles to take before the difficulties can be smoothed away. One, if course, is as to the adoption of the widely heralded scheme of reorganization and the other is to surmount the difficulties outlined in the application made by Judge Van Etter of Ulster County, E. Metzger, Kingston and George A. Knobloch for permission to file a demurrer to the whole proceeding. This action was taken on behalf of Frederick D. Bond, who declares he represents certain minority stock interests.

According to Mr. Bond, one ground taken by the demurrer is that the court has no jurisdiction of the action. He states that the complainant in this case is a corporation having a legal residence in Rhode Island and that the defendant is a New Jersey corporation. The equity suit is in New York and the demurrer holds that it should have been started either in New Jersey or Rhode Island under the federal equity procedure.

A number of additional grounds are also covered in the pleading.

If the court allows Bond to intervene with his demurrer it is conceivable that a considerable delay might take place. In case the application is denied, the right of appeal on the law point might drag in the courts for a long time, even going as far as the Supreme Court of the United States on the constitutional question involved.

At headquarters of the United States Motor Company it was stated that Walter E. Flanders recently had made an inspection and appraisal of the properties of the company and that representatives of the United States Motor Company were at present engaged in examining the Flanders plant in Detroit looking toward a consolidation as soon as the legal tangle in the United States District Court was unraveled.

Deposits of stock and claims under the proposed plan of reorganization is continuing and a tentative limit has been set for such deposits on November 9. It is said that the amount deposited already represents a material amount more than a majority.

Final action on the reorganization will be impossible until some time after November 11, but with such a large proportion of the securities and obligation on deposit it is hoped that it can be consummated without undue loss of time. The action of the court in decreeing to progress with the Maxwell program met with the hearty approval of the attorneys of the creditors.

The balance sheet, showing the aggregate assets and liabilities of the company, as compiled by the receivers will be found in full on page 904.

Judge Hough's opinion as to the recommendations of the receivers was delivered from the bench and was as follows:

The Court: Now with respect to the first application of the receivers, which is as follows:

The liquidation of selling companies and the full payment of the local creditors of such selling companies and of the dealers who dealt with such selling companies where deemed advisable by the receivers.

No general authority to the receivers to deal with all the selling companies will be given now or at any time. In my opinion, circumstances may arise in respect to any selling company, as the word is used in this litigation rendering it advisable for the receivers to liquidate themselves, to act as their own local courts, so they can pay their own local creditors in full, and the receivers are advised to prepare a separate petition as to each and any selling company which they wish to liquidate in the manner suggested.

The second proposition is with regard to payment in full of dealers who made deposits with the United States Motor Co.

In my judgment it has been sufficiently shown that there was an effort on the part of the motor companies shortly before the appointment of these receivers to create a trust fund for the securing of the said dealers who had so made deposits. Entirely irrespective of any question that might arise about deposits made so soon before the appointment of the receivers, it is in my judgment evidently advantageous from a business standpoint, that the claims of those dealers be settled, by offsetting deposits against amounts due, with the net result that there will become available, as I am informed if I correctly understand the receivers, the net sum of $33,000 approximately out of $62,000 now on deposit which is not now available to them in any case. They are authorized and directed to settle this matter in this way.

As to the third proposition regarding a payment to creditors who shipped goods or furnished materials or services in the interval between the creditors' committee circular of June, 1912, and the appointment of the receivers herein on September 12. As to those creditors it is directed that where the receivers are satisfied that any particular goods were not only furnished, but delivered to and used in a certain factory during the period specified, that certain goods and materials may be paid for and charged against that particular factory.

As to the future continuance of the business. It is directed that the receivers have authority for a future continuance of the business along the lines indicated by them in their report. They are authorized to apply for receiver's certificates to an amount not exceeding in the aggregate the $1,500,000 mentioned by them, and in such amounts as they may deem advisable, showing their reasons therefor from time to time, and that upon the issuance of such certificates, and in the order authorizing their issue, it shall be provided that the lien thereof, or payment thereof, shall be made in the first instance on properties other than those of the Maxwell-Briscoe Company, to the end that only in the event of all the other property in the hands of the receivers being insufficient to pay the receiver's certificates shall the property of the Maxwell-Briscoe Company be touched.

As to the sale of the property. It is believed that this property ought to be sold as soon as reasonably can be. The receivers in conjunction with the solicitors for the complainant are hereby directed to draft a decree of sale, concerning the form of which I give more specific directions at this time. That they do this as speedily as possible, not pausing to obtain the formal legal descriptions by metes and bounds of the real property, if any be affected, but drafting such a document as shall so show the scheme of sale proposed. That they serve notice of that proposed form of decree upon the attorneys who have appeared here today, as well as upon any who may be on the formal record on the docket of this court, and that for the purpose of discussing that form of decree an adjourned day of this meeting may be fixed. I would think that two weeks from today would be ample time for that purpose.

Mosler Loses Action

Court Holds That Canfield Patent on Chambered Spark-Plugs is Valid But Not Infringed by Defendants

Laches of Previous Owners of Patent Weigh Against Present Assignor—Case Will Probably Be Appealed at Once

JUDGE Hand, of the United States District Court, has rendered an opinion in the suit instituted by A. R. Mosler & Company against the Auto Supply Company for alleged infringement of the Canfield patent 612,701, covering a type of spark-plug which has a recess around the electrode. The opinion sustains the patent within certain narrow limitations but holds that the defendant company is not guilty of infringement.

The reasoning adopted by the court is based upon the fact that Canfield, a pioneer in the automobile industry, really devised a patentable element when he produced spark-plugs of the kind covered by the terms of the patent. Canfield, however, disposed of his patent in 1902 and later it was assigned to the Torbenson Company and afterward to the Association Patents Company, subsidiary of the old A. L. A. M. There it remained from 1906 to 1909, when Mosler purchased it.

The ruling that the patent was not infringed is based upon the fact that under the construction of the court, Mosler himself manufactured a type of spark-plug that came within the claims of the patent, long before he acquired any interest in the patent.

The words of the court are as follows:

"The suit is really against the (six) manufacturers, but whether against them or not, defendant and others have been notoriously selling these goods to a large extent for a number of years.

"Here then we have a situation where nothing was done by the patentee or his assignees for 11 years, while others risked their money in putting on the market an improved and very important device, in an industry which has developed by leaps and bounds and which has revolutionized travel for pleasure and utility. While the public has been getting the benefit of the use of the devices and the competition between the manufacturers, the assignees of this patent have sat supinely by, not even bringing one suit against any one of the many open alleged infringers.

"Then comes along an ex-infringer, on its own theory, who has bought the rights under this and another patent and asks a court of equity to fill its treasury with license fees and damage money.

"It is no excuse that complainant obtained its title only in 1909. Its claim is affected by the laches and want of equity of its assignors.

"The court will go a long distance to protect the inventor who is ahead of his times and who, unable to interest capital, finds that some one has stolen the fruits of his genius. But that is not this case.

"The patent is sustained within the limits herein dictated and it is held that there is no infringement. The bill is dismissed with costs."

Boston Electric Show a Success

BOSTON, MASS., Oct. 28—Boston's big electric show closed Saturday after 4 weeks of remarkable success, during which it is estimated that there were 500,000 in attendance. And of all the exhibitors who were pleased at the amount of business done none was more so than the men who handle the electric vehicles in Boston. Those dealers who had commercial vehicles alone found that there were innumerable places in New England where business men could utilize trucks. This was brought home to them through the co-operation of the men at the heads of the various electric light plants in the cities and towns of the New England states.

The Edison Company of Boston, the real power behind the show, had made arrangements so that the managers of the electric plants in the New England districts were allowed to give complimentary invitations to business men who used electricity or were possible users of it. With the railroads cooperating so that special excursions were run from all sections it brought to Boston to the show thousands of people each week. So out of all these visitors there were many who were anxious to get a line on what was new.

That electric motor cars would be shown was expected by some, but the greater number were surprised to find the big commercial vehicles right on the main floor. To many of these visitors motor trucks were associated with gasoline in their minds because of the fact that they had not seen any other vehicles in their territory except those operated by gasoline. So they made inquiries and examined the trucks. The dealers did the rest, for they showed how easy it was to get current from the lighting companies.

The Electric Vehicle Club has arranged now to meet every week at a luncheon at some hotel or club, and once a month have a meeting at night.

Creditors Take Charge of R. C. H.

DETROIT, MICH., Oct. 30—The condition of the business of the R. C. H. Corporation was fully disclosed to the stockholders and merchandise and money creditors at a meeting at the Pontchartrain hotel, this city, October 25.

The meeting was largely attended, the creditors present representing an indebtedness of the corporation of $1,600,000. Plans for the refinancing of the company were discussed at length and an agreement was drawn up between the creditors and the R. C. H. Corporation whereby the latter's affairs will in the future be in the hands of a creditor's committee of nine, the former directorate consisting of three.

Sixty per cent. of the capital stock is to be under the direct control of three men chosen from this committee of nine under the terms of the agreement. It was pointed out that this was done in order to protect the concern in the event of the death of the Hupp Brothers, owners of a large proportion of the stock. This agreement is to be submitted to the stockholders and creditors for their formal ratification the latter part of this week.

November 8 when the directors of the R. C. H. Corporation meet, it is expected that the entire plan will be finally adopted. The six directors who have been placed on the directorate become practically debenture holders, but it is expected that all obligations will be cleared away within the next 18 months.

The condition of the concern's affairs may best be explained by the fact that it has grown too rapidly for its capitalization. At the present time the corporation's books shows assets over liabilities of $576,000, according to the auditing of MacPherson, Weiss & Company, certified public accountants. Domestic and foreign contracts for some 16,000 cars are in hand.

The production at present is normal, the concern having 417 cars in stock at Detroit and its branches. Materials for about 1,000 more cars are at the factory. During September, 617 cars were shipped while thus far this month 342 have left the shops. By the adoption of this plan the output of the plant will not be curtailed in anyway, and at the same time the corporation's financial position will be made secure. Although the members of the new directorate have not yet signed the agreement, all are favorable to it. It is understood that the following nine will compose the committee: John Kelsey, Kelsey Wheel Company; J. F. Hartz, C. F. Hall Lamp Company; H. S. Firestone, Firestone Tire & Rubber Company; J. H. Clark, attorney; C. A. McCutcheon, American Gear Company; F. M. Randall, C. H. Fuller Company; J. H. Sieberting, Goodyear Tire & Rubber Company; C. P. Sieder, Sieder Manufacturing Company, and R. C. Hupp.

Truck Space Allotted

Practically All Ground Floor Space for Chicago Commercial Vehicle Show Divided Among 65 Makers

American-La France to Reorganize—Milwaukee Dealers Elect Officers—Denver Wants Place on Transcontinental Highway

NEW YORK, Oct. 26—Sixty-five commercial motor vehicle makers have been allotted space in the Chicago show to be held in the Coliseum, Coliseum Annex and First Regiment Armory. All of the ground floor space in these buildings has been absorbed excepting two of the least desirable, and there is a waiting list of six for these.

Last winter the show opened with eighty-two exhibitors of complete vehicles and chassis, but at the October drawing the allotments were smaller and only three or four companies went into the Armory, which, however, filled up later.

Those concerns on the waiting list are: Mogul Motor Truck Company, Chicago; Mercury Manufacturing Company, Chicago; H. J. Koehler Sporting Goods Company, New York; Ideal Automobile Company, Ft. Wayne, Ind.; Kentucky Wagon Manufacturing Company, Louisville, Ky.; Ware Motor Vehicle Company, St. Paul, Minn.

American-La France Seeks Capital

ELMIRA, N. Y., Oct. 26—In order to provide the concern with $600,000 additional cash capital, the American-La France Fire Engine Company, of Elmira, N. Y., is considering complete reorganization. The plan proposed by the fiscal agents of the engine company provides that the present bondholders will receive 100 per cent. in 7 per cent. preferred stock of the new concern with a bonus of 33.3 per cent. in new common stock. The preferred stockholders are to receive 50 per cent. in the new preferred stock and 33.3 of common, while the present holders of common stock will receive 30 per cent. in new common. With the $600,000 new preferred stock to be sold at par there will be a bonus of 100 per cent. of new common, this being offered to present stockholders on a basis of four shares of preferred to every 19 shares of the old preferred and two shares of new preferred to each 10 shares of the common.

M. A. D. A. Elects Officers for Year

MILWAUKEE, WIS., Oct. 28—Isaac G. Hickman, president of the Hickman-Lauson-Diener Company, state agent for the Ford, was re-elected president of the Milwaukee Automobile Dealers' Association at the annual meeting held on October 23. Emil Estberg, representing the Pope-Hartford and Waverly electric, was re-elected vice-president. George P. Hewitt, proprietor of the Wisconsin Auto Sales Company, Cutting, National, Westcott, Herreshoff, Little and Chevrolet agent, was elected treasurer, succeeding August A. Jonas. A. E. Raffauf, of the American Automobile Company, Pierce-Arrow agent, was re-elected secretary. The executive board consists of Messrs. Hickman, Estberg, Hewitt, Raffauf and Alton J. March, of the Curtis Auto Company, Reo representative.

Although the association wound up the fiscal year of 1910-1911 with a comfortable surplus in the treasury, reports at the last annual meeting showed a huge deficit, due to the promotion of the Vanderbilt cup races at Milwaukee this year. The association has twenty-two active members, consisting of the principal dealers in Milwaukee county.

Denver Seeks Place on Through Route

DENVER, COLO., Oct. 28—As a vital step in a persistent campaign being carried on by the Denver Chamber of Commerce, the Denver Motor Club, the Colorado State Highway Commission and other organizations, to have this city placed upon a great transcontinental highway, a trip to mark out the Denver-Salt Lake City section of the projected Midland Transcontinental Route was started this week by Charles M. Kittredge, Jr., assistant secretary of the Chamber of Commerce, and A. L. Westgard, official map-maker for the American Automobile association, New York City. Kittredge is acting as official representative of both the Chamber of Commerce and the Motor Club.

Punctureless Tire Plant Planned

DETROIT, MICH., Oct. 28—A new rubber company with capital close to $1,000,000 is reported to be planned by interests in this city and in Cleveland. It is proposed to manufacture tires which will be non-puncturable and blow-out proof, and which are the patented invention of Arthur Elliott, of Cleveland. Three patents have been issued to Mr. Elliott covering a lap-lock base, straight side walls and steel band inner liner for the tire shoe. It is understood that several rubber men are interested in the venture which is contemplating the building of a factory either in this city or in Cleveland. Negotiations are being carried on here by Charles Ritter, while the Cleveland representatives are the Standard Sales Company.

To Make New Carbureter and Clutch

DETROIT, MICH., Oct. 28—The Sprung Carbureter & Clutch Company has been incorporated to manufacture the patented devices of Edmund Sprung, which consist of a carbureter and a clutch. The former is a three-jet type, the throttle lever connecting with a sleeve which goes over the jets and which uncovers more of them as the throttle is opened. The incorporators are: Edmund Sprung, Wm. Healy, and J. S. Kennary.

List of Truck Manufacturers Given Space at Chicago Show

Coliseum

Adams Bros. Co. ..... Findlay, O.
American Locomotive Co. ..... New York
Autocar Company ..... Ardmore, Pa.
Buffalo Elec. Veh. Co. ..... Buffalo, N. Y.
Buick Motor Co. ..... Flint, Mich.
Clark Dely. Car Co. ..... Grand Crossing, Ill.
Dayton Auto Truck Co. ..... Dayton, O.
Federal Motor Truck Co. ..... Detroit, Mich.
Flint Motor Wagon Dept. ..... Flint, Mich.
Durant Dort Carriage Co.
Garford Co. ..... Elyria, O.
General Motors Truck Co. ..... Pontiac, Mich.
Gramm Motor Truck Co. ..... Lima, O.
Hupp Motor Car Co. ..... Detroit, Mich.
International Motor Co. ..... New York
Thos. B. Jeffery Co. ..... Kenosha, Wis.
Kelly Motor Truck Co. ..... Springfield, O.
Kissel Motor Car Co. ..... Hartford, Wis.
Knox Automobile Co. ..... Springfield, Mass.
Krebs Com. Car Co. ..... Clyde, O.
Locomobile Co. ..... Bridgeport, Conn.
W. H. McIntyre Co. ..... Auburn, Ind.
Old Reliable Motor Truck Co. ..... Chicago, Ill.
Peerless Motor Car Co. ..... Cleveland, O.
Pierce-Arrow M. C. Co. ..... Buffalo, N. Y.
Pope Mfg. Co. ..... Hartford, Conn.
Reliance Motor T. Co. ..... Owosso, Mich.
Reo Motor Car Co. ..... Lansing, Mich.
Selden Motor Veh. Co. ..... Rochester, N. Y.
Speedwell Motor C. Co. ..... Dayton, O.
Sternberg Mfg. Co. ..... Milwaukee, Wis.
Studebaker Corp. ..... Detroit, Mich.
United States M. Truck ..... Cincinnati, O.
Velie Motor Veh. Co. ..... Moline, Ill.
Walker Veh. Co. ..... Chicago, Ill.
Waverley Co. ..... Indianapolis, Ind.

Coliseum Annex

Bowling Green Motor Car Co. ..... Bowling Green, O.
Chase Motor Truck Co. ..... Syracuse, N. Y.
Dart Mfg. Co. ..... Waterloo, Ia.
Lippard-Stewart Motor Car Co. ..... Buffalo, N. Y.
M. & P. Elec. Veh. Co. ..... Detroit, Mich.
Service Motor Car Co. ..... Wabash, Ind.
Standard Motor Truck Co. ..... Detroit, Mich.
Transit Motor Truck Co., Inc. ..... Louisville, Ky.
Universal Motor Truck Co. ..... Detroit, Mich.

First Regiment Armory

Avery Co. ..... Peoria, Ill.
Baker Motor Vehicle Co. ..... Cleveland, O.
Bessemer Motor Truck Co. ..... Grove City, Pa.
Brown Commercial Car Co. ..... Peru, Ind.
Chicago Pneumatic Tool Co. ..... Chicago, Ill.
Commerce Motor Car Co. ..... Detroit, Mich.
Four-Wheel Drive Auto Co. ..... Clintonville, Wis.
General Vehicle Co. ..... L. I. City, N. Y.
Gramm-Bernstein Co. ..... Lima, O.
Harwood-Barley Mfg. Co. ..... Marion, Ind.
International Harvester Co. ..... Chicago, Ill.
Lauth-Juergens Motor Car Co. ..... Fremont, O.
National Motor Truck Co. ..... Bay City, Mich.
Packard Motor Car Co. ..... Detroit, Mich.
D. F. Poyer & Co. ..... Menominee, Mich.
Alden Sampson Mfg. Co. ..... Detroit, Mich.
Sanford Motor Truck Co. ..... Syracuse, N. Y.
A. O. Smith Co. ..... Milwaukee, Wis.
White Co. ..... Cleveland, O.

Recent Legal and Trade Developments

Court Denies Injunction Against Connecticut Shock Absorber Company But Imposes a Bond for $20,000

Government General Supply Committee Opens Bids for Furnishing Federal Departments

THE United States District Court at Trenton, N. J., has denied the motion recently made by the Hartford Suspension Company for a temporary injunction against the Connecticut Shock Absorber Company in the suit of the Hartford company against Ellis, an accessory dealer of Newark, N. J., charging infringement of the Truffault patents. The court, however, imposed a bond of $20,000 upon the Connecticut company, despite the fact that the order dismissed the motion for an injuncton. The Connecticut company asked leave to intervene and defend the action and the court granted the motion.

The procedure with regard to the reason for asking a bond where the motion for injunction was nominally denied attracted a large amount of interest not only in the industry but among the legal fraternity as well.

Bids for U. S. Truck Business

WASHINGTON, D. C., Oct. 29—*Special Telegram*—The General Supply Committee of the Federal government today opened bids for furnishing various government departments with motor trucks. While only six trucks will be purchased under this opening, it is intended to use the figures submitted as a basis for further purchases. The amounts of the various bids will not be made public for several days.

Streator Assets Show Margin

CHICAGO, Oct. 28—No definite policy as to the future has been outlined as yet by the Streator Motor Car Company, of Streator, Ill., maker of the Halladay, which last week was placed in charge of a receiver, the Central Trust Company. The plant is being operated by the receiver and it is expected that by the end of the week the officers of the company will be in a position to issue a statement as to their plans. It is stated that whereas the company's liabilities are in the neighborhood of $225,000, that its assets will total $400,000.

N. A. A. M. to Meet in Detroit

DETROIT, MICH., Oct. 28—The National Association of Automobile Manufacturers has given out the complete program of its first mid-year meeting which takes place in this city November 13-15. The first day will be devoted to business meetings of the board of directors of the N. A. A. M. and of the Automobile Board of Trade. On the following 2 days, papers by a number of prominent figures in the industry will be read, as follows:

November 14—Morning: "The National Association—What Has Been Accomplished and What Can Be Accomplished," S. A. Miles; "Multiplicity of Models," G. W. Bennett; "Some Selling Problems," Hugh Chalmers; "Yearly Models," C. C. Hanch.

Afternoon—"Relation of the Volume of Motor Carriage Business to the Volume of Commercial Car Business," David Beecroft; "The Commercial Car," S. D. Waldon; "Why All Manufacturers Should Use the Standard Warranty," Walter C. White; "Traffic," J. S. Marvin; "Injudicious Methods of Selling Commercial Vehicles," M. L. Pulcher.

November 15—Morning: "Good Roads," R. D. Chapin; "Territory and Discounts," E. R. Benson; "Labor Conditions," H. M. Leland.

On the evening of November 14, a banquet will be tendered to the visitors by the Detroit members of the Association at the Pontchartrain Hotel.

The N. A. A. M. now has 101 members, having added seven at the last meeting. The new members include the following: T. J. Toner, Flanders Manufacturing Company; P. D. Schenck, Speedwell Motor Car Company; Frederick A. Brand, Broc Electric Vehicle Company; U. D. Grannis, Borland Grannis Company; Carl J. Metzger, Argo Electric Vehicle Company; V. De Palmer, Michigan Buggy Company and A. H. McFarlan, McFarlan Carriage Company.

Swinehart St. Louis Company Ready

ST. LOUIS, Oct. 26—Articles of incorporation were filed recently by the St. Louis Tire and Rubber Company, with a capital stock of $150,000 fully paid. The company is to use a building in University City, which was formerly used by one of the E. G. Lewis companies. Harry C. Barker, one of the directors of the new company, stated that the company expects to be turning out all kinds of automobile tires in about 6 weeks.

The concern will be managed by J. A. Swinehart, formerly of Akron, O. The contracts with him and the patents are placed

Automobile Securities Quotations

Stock prices declined throughout the list of automobile and accessory securities during the past week. There were only three issues that advanced and they were tire stocks. Goodyear continued its remarkable strength making new high records almost every day of the week in anticipation of a wonderfully good annual report and the possibility of a juicy melon to the stockholders. Firestone also advanced smartly and the quotations of the Miller company were pegged up. Trading in the listed securities on the New York Stock Exchange was small in volume and generally at lower figures. American Locomotive, Goodrich, General Motors and Studebaker were all off from a fraction to a point or more on account of European liquidation consequent upon the Balkan uneasiness. The list follows:

	1911		1912	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co., com	..	..	145	165
Ajax-Grieb Rubber Co., pfd	..	..	94	99
Aluminum Castings, pfd	..	..	100	102
American Locomotive, com	32	32½	42½	43
American Locomotive, pfd	102½	103	107¼	107¾
Chalmers Motor Company	..	..	145	152
Consolidated Rubber Tire Co., com	7	10	10	13
Consolidated Rubber Tire Co., pfd	10	20	50	60
Firestone Tire & Rubber Co., com	170	176	278	282
Firestone Tire & Rubber Co., pfd	106	108	106	107½
Garford Company, preferred	..	..	99	100
General Motors Co., common	37	38¼	34½	35½
General Motors Co., preferred	75	76½	76½	78
B. F. Goodrich Co., common	*234	*238	†71½	†72
B. F. Goodrich Co., preferred	*118	*120	†106¾	†107½
Goodyear Tire & Rubber Co., com	225	235	386	390
Goodyear Tire & Rubber Co., pfd	104	106¼	104½	105½
Hayes Manufacturing Company	..	..	..	90
International Motor Co., com	..	..	17	19
International Motor Co., pfd	..	..	76	78
Lozier Motor Company	..	..	40	50
Miller Rubber Company	..	..	135	145
Packard Motor Car Co., pfd	104	106	105½	107
Peerless Motor Company	..	..	115	120
Pope Manufacturing Co., com	40	50	28	31
Pope Manufacturing Co., pfd	65	70	69	71
Reo Motor Truck Company	8	10	8	10
Reo Motor Car Company	23	25	19	22
Studebaker Company, common	..	..	43	43½
Studebaker Company, preferred	..	..	94½	97
Swinehart Tire Company	..	..	98	100
Rubber Goods Mfg. Co., com	85	95	100	..
Rubber Goods Mfg. Co., pfd	100	105	105	110
U. S. Motor Company, com	23	24¼	½	1
U. S. Motor Company, pfd	67¾	68¼	2½	3
White Company, preferred	..	..	105	108

*Old. †New.

in the capital stock at $59,100 while the balance is subscribed in cash. Swinehart, the largest individual stockholder, has 900 shares of stock and the other six who have been named directors each have 100 shares. They are: Harry C. Barker, C. M. Skinner, A. C. Einstein, W. H. Glasgow, Roy F. Britton and C. C. Collins.

Contracts will be let in a few days for the erection of an addition to the present building 30 x 100 feet in which will be placed the heavier machinery. All the machinery necessary for the operation of the plant has been received and the work of installation will start immediately.

Crude Rubber Declines 2 Cents

Crude rubber worked lower during the past week with purchases confined to the minimum of requirements and offerings checked in view of the known character of the demand and the hope that extensive buying will be forced in the more or less distant future. The level for up-river fine declined to $1.05 with pale crêpe at $1.02 1-2. This is a decline of 5 cents a pound for up-river since mid-September and 15 cents a pound for pale crêpe. The basic reason is to be found in the increasing shipments of plantation rubber. The trade would not be surprised at some immediate strength in the market but the prevailing opinion is that lower levels are to be expected because of the larger supply becoming available. Receipts at Para are estimated at 2,316 tons for September, which is well in excess of last year and about what the trade expected.

Market Changes of the Week

The most important features of the week's market was the decrease of lead cottonseed oil, and rubber, and the increase of Bessemer Steel, Open-Hearth steel, and scrap rubber. Lead dropped on Friday to $5.00 per hundred pounds, and remained at that figure to the close of the week, with a loss of $.07 1-2. Cottonseed oil dropped $.31 due to the inactiveness of trade, closing $5.67 a barrel. Bessemer steel and Open-Hearth steel experienced a $.50 gain in price, due to the large contracts by the steel companies for those products, Bessemer closing at $28.00 a ton, and Open-Hearth at $29.00. The rubber markets were weaker, due to quiet trading. Here in New York consumers either held aloof from the market or limited their purchases to comparatively small quanities for early use. Jobbing sales were reported on the basis of $1.04 for up-river Para, a decrease of $.02 from Wednesday's price.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, lb.....	.09¼	.09¼	.09¼	.09¼	.09¼	.09¼	.....
Beams & Channels, 100 lbs....	1.61	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel, Pittsburgh, ton..	27.50	27.50	27.50	27.50	28.00	28.00	+ .50
Copper, Elec., lb..	.17⅝	.17¼	.17¼	.17¼	.17¼	.17⅛	— .00⅛
Copper, Lake, lb..	.17½	.17⅜	.17⅜	.17⅜	.17⅜	.17⅜	— .00⅛
Cottonseed Oil, Oct., bbl.....	5.98	5.96	5.89	5.71	5.71	5.67	— .31
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	.....
Fish Oil, (Menhaden) ...	.33	.33	.33	.33	.33	.33	.....
Gasoline, Auto, 200 gals @.....	.21	.21	.21	.21	.21	.21	.....
Lard Oil, prime...	.88	.88	.88	.88	.88	.88	.....
Lead, 100 lbs.....	5.07½	5.02	5.00	5.00	5.00	5.00	— .07½
Linseed Oil.....	.60	.60	.60	.60	.58	.60	.....
Open-Hearth Steel, ton.....	28.00	28.00	28.00	28.00	29.00	29.00	+ .50
Petroleum bbl., Kansas crude...	.70	.70	.70	.70	.70	.70	.....
Petroleum, bbl., Pa., crude.....	1.60	1.60	1.60	1.60	1.60	1.60	.....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	.....
Rubber, Fine Up-river Para...	1.06	1.06	1.06	1.04	1.04	1.04	— .02
Silk, raw Ital.....	....	....	....	....	4.40	....	.....
Silk, raw Japan...	....	....	....	....	3.95	....	.....
Sulphuric Acid, 60 Beaumé.....	.99	.99	.99	.99	.99	.99	.....
Tin, 100 lbs.....	5.02	5.02	5.02	5.02	5.06	5.03	+ .01
Tire, scrap.....	.09⅛	.09⅛	.09½	.09½	.09½	.09½	+ .00⅜

Rise in Oil May Be Reflected in Steel

Tremendous Consumption of Petroleum Products by Automobiles, Etc., May Affect Cost of Steel Processes

Price of Fuel Oil Used in Steel Mills Has Advanced 50 Per Cent. Within the Year

CHICAGO, ILL., Oct. 28—According to Standard Oil reports, the motor car is responsible for a revolution in the steel manufacturing processes now in vogue. This may result in higher prices for steel and crucible steel castings. The cause is laid to the immense consumption of the higher grade products of petroleum principally by motor cars, and by motor boats, ocean vessels and locomotives. Fuel oil, which is the residue left after the distillation of gasoline, benzine, naptha and kerosene, is at present used in enormous quantities. The Inland Steel Company uses 2,000,000 gallons of the oil per month, the International Harvester Company, 120,000 barrels per year, and the Illinois Steel Company, which formerly was a heavy consumer of this fuel, foreseeing the result of the steadily increasing prices, has been changing to other methods, and now uses very little.

Fuel oil is used extensively in the manufacture of glass, brick and tile, and in forging, annealing and founding of steel. It is preferred for the latter uses because of the absence of sulphur fumes in burning, which must be constantly guarded against in the use of other fuels. These fumes have a very injurious effect on steel, making it more brittle.

The changes necessary, according to estimates made by G. H. Jones, vice-president of the Inland Steel Company, will cost that company from $400,000 to $500,000, the cost to the industry therefore, in the aggregate, will probably run into the millions of dollars, which can only be met with by an increase in the price of steel, in all the forms affected.

The Standard Oil Company has given formal notice to the principle consumers that the Whiting refineries can no longer supply the fuel oil that they have in the past. This is taken to mean, by some, that the Standard Oil Company has discovered a process of refining by which a higher percentage of the crude oil can be turned into the better grades, and hence more profitable, kinds of oils and distillates. At present the price of fuel oil has advanced 50 per cent. within a year, which fact would eventually force steel manufacturers to abandon its use in favor of producer gas, without the edict of Rockefeller's minions.

The price of western fuel oil at present is about 2 1-2 cents per gallon, while Pennsylvania prices are prohibitive. It is said that California oils would cost from 10 to 12 cents per gallon in Chicago.

Cotton Makes the Cars Go

NEW ORLEANS, Oct. 28—Sales during October have exceeded any single month in the history of the industry in this city and tributary territory. A large cotton crop is the basis of the general prosperity which the South is enjoying. The growth of the trucking business within a radius of 100 miles of the city is proving a great source of wealth and is having a direct influence on the motor car industry, as many of the owners of truck farms live in the city and have to make frequent trips to and from the properties.

Digest of the Leading Foreign Journals

Some Elements to Be Considered in the Choice of Inlet and Exhaust Valve Sizes Discussed by Von Löw—Also the Equal Distribution of Gas Mixture to Cylinders—Fischer's Motor and Change-Gear—Wheel for Heavy Loads

INLET and Exhaust Valve Dimensions—The successes accomplished here and there in raising poppet valve motors to the same maximum power which is obtained with the best sleeveless motors of the same cylinder dimensions, or even above it, have led to renewed investigations of the proportion in valve dimensions which should be expected to fill the cylinder as completely as possible with the explosive mixture, it being understood that all the advantage of the sleeve-valve construction in the matter of power depends upon a superiority at this point. A study by Freiherr von Löw on this subject is rendered in substance in the following:

The views of constructors vary widely on valve diameters and gas velocities, as will appear from the appended table giving certain data of three representative German cars:

		Benz 1910	Adler 1910	Horch 1908
1	Rear wheel diameter	0.8 m.	0.8 m.	0.8 m.
2	Rear wheel circumference	2.5 m.	2.5 m.	2.5 m.
3	Rear wheel revolutions per kilometer	400	400	400
4	Bevel gear, numbers of teeth	25÷62	19÷55	13÷42
5	Bevel gear, ratio	1÷2.48	1÷2.89	1÷3.23
6	Revolutions of motor shaft at 60 kilometers per hour vehicle speed, direct gear	996	1156	1292
7	*V-max.* = highest average speed on level 8 kilometer stretch	134 km./hr.	125 km./hr.	89 km./hr.
8	*t-max.* = r.p.m. at *V-max.*	2217	2412	1913
9	h = piston stroke	175 mm.	150 mm.	120 mm.
10	$v = \frac{h\pi}{60} \times t\text{-}max.$ = highest piston speed	20.1 m/sec.	18.8 m/sec.	11.9 m/sec.
11	d = diameter of bore	115 mm.	105 mm.	85 mm.
12	$F = \frac{d^2\pi}{4}$ = piston area	104 cm.²	87 cm.²	57 cm.²
13	q = area of inlet valve	44 cm.²	16 cm.²	12 cm.²
14	Area of exhaust valve	21 cm.²	16 cm.²	9 cm.²
15	Gas current velocity in inlet valve = $\frac{F}{q} \times v$	45 m/sec.	102 m/sec.	57 m/sec.
16	Current velocity in exhaust valve	92 m/sec.	102m/sec.	76 m/sec.

[The exhaust velocity, it will be noticed, is given without reference to the expansion of the gases which takes place in the exhaust valve.—Ed.]

As this table shows, Adler makes the inlet and exhaust valve diameters alike and reaches a gas velocity of 102 meters per second at a vehicle speed of 125 kilometers per hour. In the Benz car the inlet valve area is about twice as great as that of the exhaust valve and the inlet gas velocity is 45 meters per second with a vehicle speed of 134 kilometers. And in the case of Horch the inlet and exhaust valve areas are as 4 to 3, while the inlet velocity is 57 meters per second at 89 kilometers per hour.

The most favorable proportion between the two diameters can probably only be determined by systematic tests, but certain things which are to be considered in the choice of the diameter may be deduced by mere reasoning with the aid of charts. In Fig. 1 *aa* represents atmospheric pressure and *vv* a complete vacuum, while the pressure variation during the larger portion of the exhaust stroke is shown in line 1-2. At the point 2—when the piston has reached dead center at the end of the exhaust stroke—atmospheric pressure has not yet been reached; the gases in the combustion chamber retain a tension represented in line 2-3 owing to strangulation in the exhaust valve. When now the piston begins its new stroke these gases will first expand and atmospheric pressure will only be reached at point 4, and here, then, begins the real induction stroke. The line 3-4 represents the volumetric loss of explosive mixture at the beginning of the induction stroke. (Even if the inlet valve is opened as early as at the dead center, so that the tension 2-3 can expand into the induction pipe, this will make no difference, for the expansion of the exhaust gas into the induction pipe will push the fresh mixture back and the latter will not reach the cylinder till the piston is at point 4, and the expedient of leaving the exhaust valve open after the dead center is considered later.)

It is now to be examined what the effect will be of the same degree of strangulation at the end of the induction stroke. Under this condition the shortcoming in reaching atmospheric pressure, represented in line 5-6, must be equal in tension value to the pressure represented in line 2-3. The induction valve is supposed to be closed at dead center, and now the compression stroke begins from point 5. As the compression curve at this point rises much more slowly than the expansion curve falls from 2, the considerable volumetric loss represented in line 6-7 is suffered at this point, and it is noticed that this loss is about six times as great as the loss 3-4 sustained at the beginning of the induction stroke. [The proportion in the losses is about the same as between the volume of the combustion chamber and the total cylinder volume—usually 1 to 6.—Ed.]

It is hereby shown that with equal strangulation of the gas in the two valves the volumetric shortcoming in explosive mix-

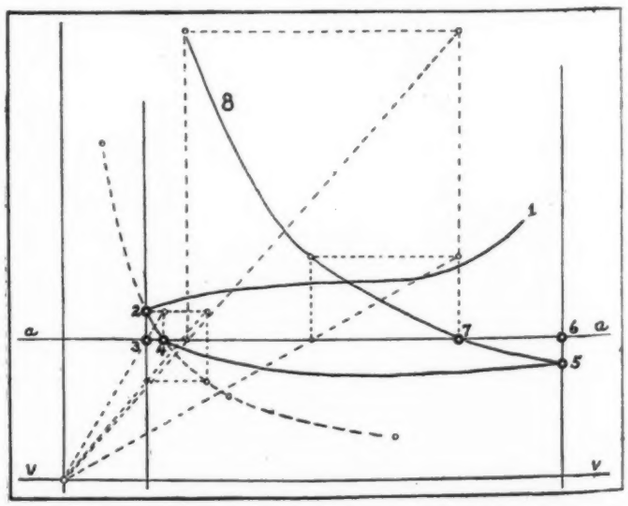


Fig. 1—Diagram showing exhaust (1—2), induction (4—5) and compression (5—7—8) curves; valves opening and closing at dead centers and being of equal diameters and lift

ture caused by the strangulation in the induction valve is decidedly larger than the loss caused by strangulation in the exhaust valve. And as these losses may be reduced, to be sure, by deferred closing of the valves, but never can be quite obviated, it seems that it should be correct to make the inlet valve larger than the exhaust valve, in accordance with the design of Benz and Horch in the above table. It is also notable that among racers those which may be considered the most important have been won with motors having the induction valves larger than the exhaust valves. [It probably does not escape the reader that, in addition to valve diameters, the valve lift and the current-energy may also play a part in determining the degree of strangulation to which the flow of gas is subject.—ED.] On the other hand, it must be said that the leaders in the matter of enlarged inlet valves—Daimler and Horch—have lately gone back somewhat on this design; for the Daimler company now builds aviation motors mostly with valves of the same size and Horch has in his new Audi cars made the diameters equal. Lehmbeck and Isendahl in their book *Design and Calculation of Automobile Motors* recommend even to make the exhaust valve diameters twice as great as the inlet valve diameters, evidently with a view to the increase in the volume of gas caused by the explosion.

EFFECTS OF GAS CURRENT INERTIA

As already referred to, the cylinders can be filled more completely by deferring the closing of valves. This effect depends in the case of high-speed motors mainly on the expansive energy and momentum of the moved gases. But the opinions of engineers vary as much on this subject—how much the valve closure should be retarded—as they do on valve diameters. An interesting table in the book by Lehmbeck and Isendahl (opposite to page 70 in the second edition) shows that in twenty-eight motors the retardation of closure varies from 0 to 49 degrees after dead center for the inlet valve and from 0 to 22 degrees for the exhaust valve. In the case of multi-cylinder motors it may even be justifiable on account of current-momentum at high gas velocities to arrange the opening and closing of the valves differently for the different cylinders, because the customary inlet manifold for four-cylinder motors, on the plan indicated in Fig. 2, does not render an equable distribution of the gas charge to the cylinders possible. An equable distribution may perhaps only be effected by an arrangement of the manifold as shown in Fig. 3.

On the plan of Fig. 2, cylinder 1 must set the gas in the left portion of the manifold in motion, but cylinder 2 finds it already in motion and therefore gets more gas if the valve regimen is the same. The cylinder marked 3 is the next one to act, and the gas now stops moving in the left portion of the manifold and begins to move in the right portion where cylinder 4 gets more gas than cylinder 3. Whether this "more-or-less" element is a matter of practical importance may easily be decided by experiment, for example, by first cutting out the spark from the inner cylinder of a pair and afterwards from the outer cylinder. The suctions remain unchanged by this proceeding while it should be shown plainly, with a dynamometer, to what extent the power varies. A manifold on the plan of Fig. 3 gives no rise to stoppages in the currents. Cylinder 1 draws the larger part of its charge from the left branch leading from the carbureter V, but, as cylinder 4 was in action just before it, there will also be a current toward it of the surplus gas remaining in the pipe which leads to 1 from 4. When cylinder 1 ceases to draw, the gases set in motion by it move farther to cylinder 2 and, when this ceases to draw, they move farther to cylinder 3, both 2 and 3, however, also drawing directly from the carbureter, and when the valve of 3 is closed, the current moves on to cylinder 4, and so on. Through the uninterrupted flow of the gases losses otherwise caused by current-momentum are thus avoided.—From *Zeitschrift d. M. M. Vereins,* September 15.

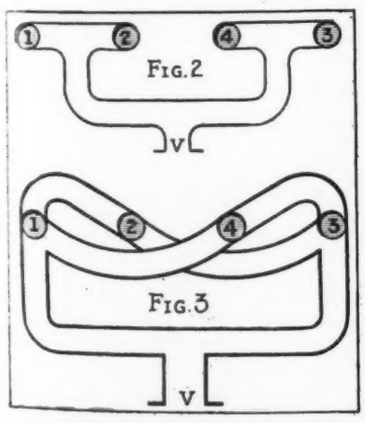


Fig. 2—Customary induction manifold.
Fig. 3—Arrangement giving equal distribution of gas to all four cylinders.

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SMALL Swiss Car with Valveless Motor—Among the vehicles which depart from the customary type the Martin Fischer car, which is made at Zurich, Switzerland, has attracted attention by a workmanship which is declared most admirable in conjunction with design features which appear at first glance preposterous. The different gear speeds are obtained for example, by taking a pinion mounted on the rear end of a short driving shaft, which is coupled to the clutch shaft by means of a universal joint, to any one of three internal gears of different diameters, all of which are formed in a disk of hollow conical formation, and this disk connects by a universal joint (with a transmission brake) with a driving shaft of the ordinary type, so as to take the power farther to the rear axle. The smallest of the internal gears, which of course is in the center of the disk, is of the same dimensions as the pinion, which therefore simply fits into it, the two parts forming a positive clutch giving a direct drive without any gear transmission whatever. In order to bring one of the other gears into action, shifting forks of the usual kind are made to displace, longitudinally, a bearing-block in which the rear portion of the short driving shaft rotates, and this movement in conjunction with a cam-plate brings the pinion on the end of the shaft into mesh with one of the internal gears. The construction is evidently intended for a vehicle which may be driven practically all the time on the high gear, as continued driving on any of the other gears involves a considerable angular deflection of the short driving shaft and consequently much wear of the universal joint. The clutch in this vehicle is an open multiple plate clutch composed of alternate fiber and brass or bronze disks and is operated without lubrication. The gearbox, containing the universal joint and the short driving shaft

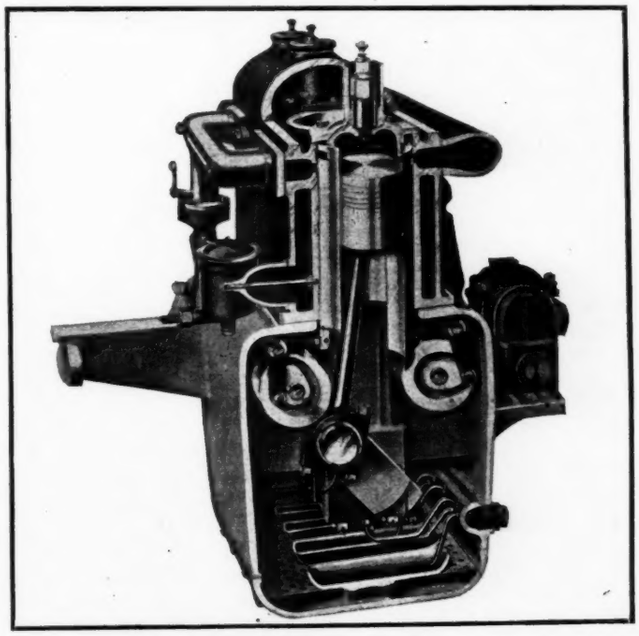
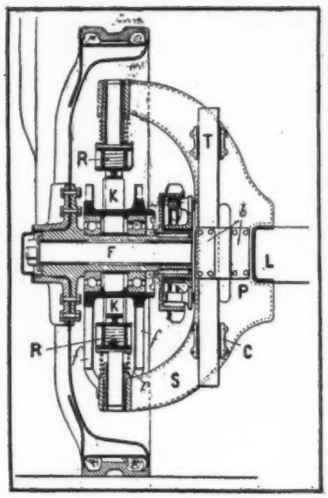
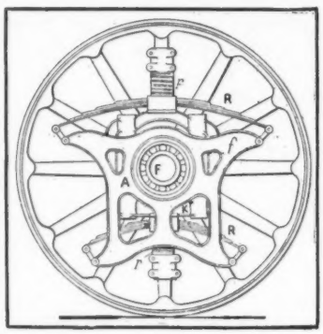


Fig. 4—Section through the Martin Fischer valveless motor





Figs. 5 and 6—Section and partial side view of the Heilmann truck driving wheel as made for vehicles with chain drive. The spring suspension is in the wheel plane and axles are dispensed with

with bearing-block, cam-plate and locking provisions, is located immediately behind the clutch, suspended at three points.

The motor used in this car is shown in Fig. 4. The cylinder bore may be conceived as a cylinder with two opposite bay windows of crescent-shaped cross-section. In these enlargements of the bore two valve bodies of the same section are ensconced, so as to leave an exactly cylindrical bore for the piston, as usual, and they are arranged to be moved up and down by the means plainly shown in the illustration, one operating the inlet and the other the exhaust of gases by means of ports at their upper ends. They enclose each only about one-fourth of the piston surface, so that one-half of the cylinder wall has the same chance for being properly cooled as in a poppet valve motor, and with a view to the same purpose of safeguarding the cooling—which has proved the most difficult feature to bring into permanent working order in sleeve-valve motors in general—an elastic ring above the combustion chamber assists the piston rings in pressing the two valve segments tightly against the built-out portions of the cylinder wall, at the same time securing the compression. The enlarged surface in contact with the cooling water also helps to bring about the desired thermic condition. Manufacture of the valve segments is facilitated by producing them in one piece and afterwards splitting this into two perfectly symmetrical halves. This motor has been operated successfully but no data are at hand with regard to its efficiency.—From *Auto-Technik*, September 13.

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HEILMANN'S Truck Wheel—A wheel intended for use on trucks of heavy load capacity has, after several years of experiments, been so far perfected as to attract favorable notice from the technical committee of the Automobile Club of France. It is designed by a Mr. Heilmann, well known as a prolific inventor and especially as the designer of an electric locomotive. Its construction is shown in Figs. 5, 6 and 7. The objects of the construction are to dispense with the use of axles, to bring the load directly in line with the wheel plane, to permit the lowering of vehicle body and load and the increase of wheel sizes, and to reduce the swaying of the vehicle body and the load, not only by lowering the center of gravity but especially by increasing the width between springs and to improve the spring suspension.

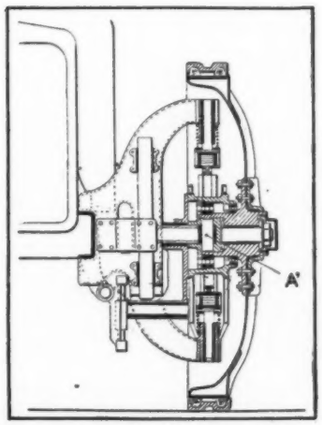

Fig. 7—Heilmann front truck wheel

The spindle F receives the hub of the wheel and is integral with the sliding pieces T which have a vertical movement in the guides C upon the heavy U-shaped bracket S, the latter being securely riveted to the vehicle frame L. Guide plates P in friction contact with bronze bands *b* assist in maintaining alignment and transmitting traction effort to the chassis. The springs are placed between the wheel hub and the ends of the bracket. Special precautions are taken to insure that the spring action shall always act accurately in the plane of the wheel. To this end, there is mounted upon the wheel hub proper, which has a long parallel, bearing upon the spindle, another hub revolving upon a double row of ball-bearings. This second hub comprises a middle portion A carrying two stems which are guided vertically in the frame K and are located in the central plane of the wheel. On each side pressed steel horns *f* support the ends of leaf springs R. The frame K serves to join the two spring clips and is continued above and below in the form of rods which are clamped in the arms of bracket S. Intermediate portions of them serve as guides for helical springs which are stiffer than the leaf springs.

The front wheel requires a somewhat different construction which may be figured out by an analysis of Fig. 6 showing a divided spindle and a pivot pin A upon which the outer portion of the spindle may turn, while the shaft portions of frame K are also journaled in the ends of the bracket S. The construction seems to be too complicated to enlist serious interest in its details but at least shows to what lengths a capable mechanical mind finds it necessary to go in order to find a supposedly acceptable substitute for current construction in the matter of the running-gear for automobiles.—From *Bulletin Officiel*, September.

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ELECTRIC Smelting Ovens—The Sweedish *Elektrometal* company has patented the method illustrated in Fig. 8 for smelting iron and steel. The free polepieces from each phase of a two-phase alternating current are connected each with one of the two electrodes, or groups of electrodes, which hang down into the furnace and from which the current, with formation of an arc, goes into the melt; and the other set of polepieces of both phases is connected with the conductive furnace lining. The oven is mounted upon the iron plates 10 which at the same time can act as conductor for the resulting current of the phases. If the lining consists of magnesite, dolomite or silicious substance which is not sufficiently conductive when cold, a layer 11 of graphite, which is not thermo-conductive but is electro-conductive at any temperature, must be placed on top of the iron plates. But if tar or pitch is used as a binder in the lining this is unnecessary. The electrodes 12 which are connected with the free terminals of the phases are adjustable and pass through a cooling-box in the masonry. This construction is said to admit of de-sulphurizing and de-phosphorizing of the melt.

The design of an electric resistance oven intended to obviate the great radiation of heat occurring in the

(*Continued on page 906*)

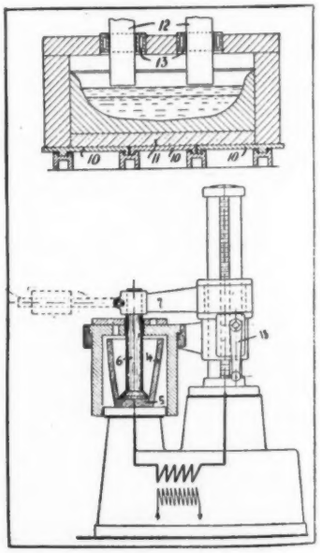


Fig. 8—Electric arc smelter. Fig. 9—Electric resistance smelter. New types

Welding Copper by Flame

An Italian Engineer Relates Experiments with Copper and Its Alloys under Oxy-Acetylene Flame

Paper read by Dr. E. Carnevali, Royal Polytechnic School, Turin, Italy, before the Institute of Metals, London, England, September, 1912.

I HAVE undertaken the study of the oxy-acetylene welding of various metals, iron excepted, largely used in modern industry, particularly copper and its principal alloys and aluminum. In this study I have tried to reproduce as closely as possible the conditions which can be obtained in practice.

I propose to divide this group of researches on the oxy-acetylene autogenous welding of metals largely used in practice, other than iron, into two groups, as follows:

First Group: Oxy-acetylene autogenous welding of copper and its principal alloys.

Second Group: Oxy-acetylene autogenous welding of aluminum.

Copper—A first series of experiments was carried out with pure copper, containing 99.9 per cent. of the metal, the welding metal being copper wire of equal purity, supplemented in certain cases by a small quantity of phosphorus, in order to obviate possible oxidation of the metal during the process of welding.

The samples were cut off round wire-drawn rods, measuring 35 millimeters (1.25 inch) in diameter; each sample was sawn half through, and the edges were thrust apart in the form of a V at an angle of about 45 degrees. After welding, some of the samples were cooled in air, while others were subjected to various thermic and dynamic processes; and, being thus prepared for mechanical experimentation, were so treated as to undergo a notable diminution of their original diameter in order to ascertain the success of the welding operation, care being always taken that the weld should be in the center of the sample. Before and after the mechanical tests, from each sample a portion was taken from the zone of welding, and a portion from the immediate neighboring zone, for purposes of microscopic examination. In Tables 1 and 2 a summary is given of the experiments and observations made in this first series of researches. A microscopic study of the samples was directed to the zone of welding, including the structure of the portion added for the weld, also the original structure of the metal and its structure in the intermediate stage. This research exhibits clearly the change induced by the process of welding in the mechanical properties of the metal, as also the profound alteration of its structure.

The microscopic examinations showed the great development which the copper crystals underwent, a development due to the high temperature attained by the fused metals in the process of welding. The suboxide formed during the process and dissolved within the metal. On the contrary, where the metal used for the weld consisted of phosphorized copper, the suboxide was practically eliminated; but coincidentally with that elimination a very slight modification in the mechanical properties of the metal was noted. This proved that the small quantities of suboxide disseminated in the zone of welding had but little effect in the way of changing the properties of the metal. The difference of structure between the original metal and the metal added in welding could be detected by the eye. After a torsional test to try the merit of the weld, the metal was not deformed by the strain to which it was subjected and the rupture under test did not take place in the fused and welded zone, but in the neighboring zone, following the margin of the weld circles in the original metal that had not undergone fusion.

A more minute investigation, while showing continuity between the welding material and the original metal also reveals in this intermediate zone the pressence of innumerable tiny vesicular cavities, imparting to it a peculiar loose granulation, apparently due to the presence of oxides.

In every case of rupture in the welded sample when tested the rupture took place along the margin of the chamfer. The explanation of this apparently curious fact is easy enough, if we consider under what conditions the welding of copper takes place. The great thermal conductivity of copper, for one thing, is well known; this conductivity, indeed, is so great as to make the process of welding big masses extremely difficult, if not impossible. We know also how easily that metal absorbs gases at high temperatures. In the oxy-acetylene process of welding the tongue of the flame is rich in hydrogen and in carbon monoxide, products of combustion which are easily absorbed by the metal during the heating up that precedes fusion.

When the internal surface of the parts which are to be welded begins to melt, then the metal used for the weld is applied thereto, its fusion taking place with extreme rapidity, the period of heating being very brief, as the metal used consists of fine-drawn wire. Cooling and solidification also ensue quickly; while from the mass of metal which heated up more slowly, that is, from the original surface of the chamfer, the gases absorbed in great quantity during the period of heating which preceded the actual welding are eliminated coincidentally with the fall of temperature.

But the elimination of these gases is not complete, as the main mass of the added welding material is at this time quite solidified, and so their occlusion determines the formation of small vacuoles along the original surfaces of the welded parts, that is, along the surfaces of chamfer. These surfaces, pitted with vacuoles and considerably oxidized (despite the precautions observed during the process of welding), constitute a plane of weakness when the metal is subjected to strains and stresses, and it is consequently along them that fracture takes place.

The inevitable existence in the zone of welding of a weak surface of low resisting power being admitted, it will be easily understood how, when carrying out mechanical processes on the weld, as, for example, by hammering, which are intended to assimilate the structure of the welded portion to the original structure of the metal, we obtain a very low efficiency factor, if not one equivalent to zero. This will be noted on referring to the data set forth in Table 2, and for this reason I have not thought it opportune to insist on these mechanical processes in the course of the various series of experiments.

Of greater efficacy, on the other hand, are thermal processes, such as reheating for about half an hour to 750 degrees or 800 degrees Centigrade, to which several samples were subjected after welding, as may be gathered from the results set forth in Tables 1 and 2. A favorable effect on the mechanical properties of the welded metal might be expected from this treatment.

TABLE 1—SHOCK TESTS WITH THE CHARPY APPARATUS ON PRISMATIC RODS, 10x10x60 MILLIMETRES, WITH SEMICIRCULAR NOTCH HALF-WAY DOWN, 2 MILLIMETRES DEEP (DISTANCE OF SUPPORTS, 40 MILLIMETRES)

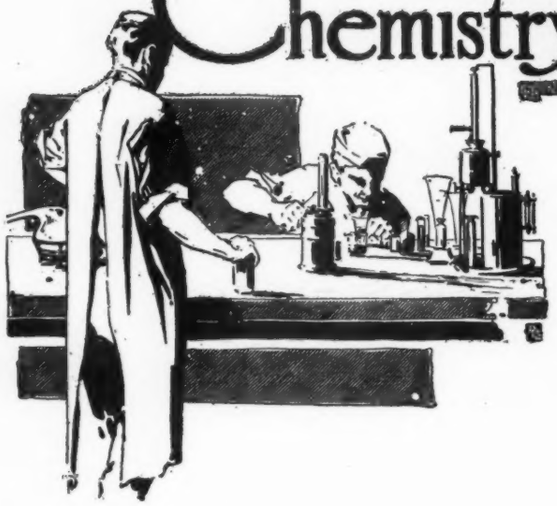
BOB (WEIGHT) = 22.45 KILOGRAMMES

h = 1.3363 METRE

Number of Sample	Initial Dimensions of the Sample	Thermal Treatment	Angle of the Indicator	Breaking Test Kgs. Mm.	Remarks
1	Rods, 35 mm. in diameter.	.....	110°	8.936	Not welded.
2	Rods, 35 mm. in diameter.	Reheated	109°	9.194	Not welded.
3	Rods, 35 mm. in diameter.	Cooled in air after welding.	139°	2.464	Welded with phosphorized copper; medium - grained fracture.
4	Rods, 35 mm. in diameter.	Cooled in air after welding.	134°	3.407	Welded with pure copper; coarsely granular fracture.
5	Rods, 35 mm. in diameter.	Reheated after welding.	132°	3.807	Welded with pure copper; coarsely granular fracture.

(*For Table 2 see page 907.*)

The Chemistry of Cylinder Oils



Facts Based on Chemical Analysis of Cylinder Oils by W. Jones Obtained In Many American Cities and Towns

Part I

This is the first of a series of articles on cylinder oils, which will appear from week to week. Discussions are invited and the columns of THE AUTOMOBILE are open to pertinent criticisms.

By W. Jones

WHAT is a good cylinder oil? What are the standards of measurement by which a good oil for an automobile cylinder can be determined? In every field of science we have units of measurement, or standards by which values are gauged. In the financial world 6 per cent. is the present standard of money value per annum. If you pay 12 per cent. it is usury, and you cannot get it at 1 per cent.

In dealing with oils for automobile cylinder lubrication what are the standards for measurement? Salesmen speak of viscosity, of flash point, of fire point, of specific gravity, of carbon test and of acid test. What is the particular value of each in determining the merit of any oil, and in what proportions should each of these characteristics figure in the makeup of a satisfactory oil?

In this and the following articles of this series an effort will be made to analyze oils as applied to the cylinders of gasoline engines. The facts stated are deductions from chemical analyses and tests with oil. This first article is largely elementary and introductory, and many of the questions which will be suggested in the reader's mind will be discussed in succeeding articles. It is aimed to draw attention to the behavior of various oils under high temperatures and pressures so far as loss in viscosity and carbonization are concerned.

The requirements of the automobile, for a cylinder oil to give satisfactory results, are such as to make the selection of oil for this purpose a much more important matter than for any other kind of motor.

This is due to the motor being an internal combustion type, which produces very high temperatures in the cylinder. These high temperatures produce certain effects from the oil in the cylinder that we do not get in any other piece of machinery.

Our great trouble with this motor is the carbonization of the oil at the high temperature, which is of course a necessary evil.

However, all oils do not act alike in this respect. Some oils give much more trouble in regard to this carbon deposit than others, and it is with a view to determine a specification which would represent an oil that would give the best satisfaction and yet be possible to obtain in the market, at a price that would not be prohibitive. Such an oil should not only lubricate, but should give little trouble from the carbon deposit in the cylinder. An oil of this character would be represented by the following specifications:

Specific gravity should be between	0.8600 and 0.8800
Specific viscosity at 212 should be not over	1.200
Carbonization should be between	0.3% and 0.5%
Flash point	350°F. to 400°F.
Fire point	400°F. to 450°F.
The acidity should not be over	0.003%

The oil should show no action on metallic iron, after 48 hours immersion, and heating to 400° Fahrenheit.

In starting this work it appeared to be the best plan to begin with the deposited carbon in the cylinder. We therefore obtained a fairly good-sized sample of this troublesome substance for analysis, which we found to consist of:

Carbon	86.34%
Metallic Oxides (Iron with a small amount of Copper)	3.96 "
Oil	9.70 "

We would expect to have this deposit fairly saturated with oil, which was the case, but we were a little surprised to find such a large amount of oxide, which simply means one of two things, either the oil carried enough acid to corrode the metal of the cylinder, and thus produce the oxide, or that it was produced by the abrasion due to the presence of the solid carbon. In either case, it would seem that the wear on the cylinder and piston would be rather heavy. The causes for this wear will be taken up later on, when we come to consider the individual oils.

It being impossible from the observed results to tell what, if any, special kinds of oils were producing these results, or if any special oil would carbonize more than another. We decided to make tests on those oils which were in general use, or which were recommended by the automobile manufacturers. We therefore sent a circular letter to all the large builders, asking what oil they recommended or were using for their machines. To this a large number of replies have been received, and it has been a surprise to see what a wide variation has been recommended as the most suitable, ranging from the very lightest Russian oil to the heaviest American oils.

It does not seem possible that there can be enough difference in the construction of the engines to call for any such difference in the oil required, and while there may be a vast difference in the handling or management of the engine, even this could hardly call for any such difference in the oil.

We have obtained samples of the oils recommended, and representing oils in general use. These samples have been subjected to the usual tests for oils of this class, such as gravity, viscosity at two temperatures, flash and fire points, and also for carbon, or what might be called carbonizable carbon; that is, carbon produced from the oil, not exactly as it is produced in the cylinder, which would, of course, be quite impossible in a laboratory test, but in such a way as to represent the results produced in the cylinder. We experimented in many ways to get these results, and finally found

that we got the best and most concordant results by taking a weighed amount of the oil in a well-covered platinum crucible and raising the temperature high enough to drive off all the oil, but not hot enough for ignition, and finally increasing the heat to a full red, to burn off any carbon which may have collected on the outside of the crucible.

The viscosities are reported as specific viscosities, taking water as unity. That is, dividing the number of seconds it takes a given amount of oil to pass through a certain sized aperture by the number of seconds it takes the same amount of water to pass the same aperture. The other tests were made in the usual way.

In looking over the tests as tabulated we have a fairly wide variety of oils. In gravity we see a variation of from 0.8651 to 0.9103, in oils showing a much wider variation in the viscosity, which is from 1.7647 in No. 1867, to 18.6071 in No. 1896/e. This last, however, is a special oil for use in motor cycles. It has been included in this list for the extremely high viscosity, which we think may be of interest as we go further into the subject of viscosity.

It may be further observed that **the highest gravity does not by any means give us the highest viscosity,** neither does **the lowest gravity give the lowest viscosity. These figures do not appear to have any relation to each other in the least. It may also be noticed that the higher the viscosity is at the temperature of 80 degrees Fahr. the quicker it falls,** so that upon reaching the temperature of 212 degrees Fahr. we find a very much wider variation for the high viscosity than for the low.*

In looking over the amounts of carbon produced from these oils we find that they follow more nearly the viscosity, although it does not do so in all cases, for we find that in No. 1890/a, where we have a viscosity of 5.7657, there is 0.80 per cent. carbon, while in No. 1894/b there is a viscosity of 4.4643, nearly one-fourth less, and a carbon product of 1.70 per cent., or over double. It is therefore quite impossible to foresee from the gravity or viscosity just how the oil is going to act in regard to the carbon deposit.

The most important determination seems to be the percentage of carbon deposited, and it would seem to decide the value of the oil so far as this carbon deposit in the cylinder is concerned, and without stating the names of the different samples we will say that oil No. 1867, at the top of the list, is an oil which has been more highly spoken of than any of the others. This would tend to show that the figures for the carbon, which, while we do not think they represent accurately the amount of carbon that would be produced in the cylinders, still show the relative proportion which might be expected from the different oils.

There is one other case which we would like to call attention to, that is, No. 1894/a and 1894/b are supposed to be the same oil. They were both received under the same brand, only one was obtained in New York and the other in Detroit.

*To explain: No. 1867 has a viscosity at 80 Fahr. of 1.7647 and at 212 degrees Fahr. of 1.428, a drop of .6219. Compare this with No. 1896 D, which is an automobile oil. At 80 degrees Fahr. its viscosity is 6.3214, at 212 degrees Fahr. it is 1.4285, a drop of 4.8929 or practically eight times that of No. 1867.

Use of Castor Oil

Pharmaceutic castor oil, the colorless product used for medicinal purposes, is the only vegetable oil that is recommended for purposes of lubrication. When a motor is in a delicate state, or, if it is desired to make a long, high-speed run, it is not out of place to dose with castor oil, removing all traces of other lubricating oils before resorting to the castor oil treatment. Castor oil is efficacious when it is desired to operate at high piston speeds, say, 2,000 feet per minute. It will be remembered that 1,000 feet per minute of piston travel is regarded as the normal rate of piston speed.

It would be imprudent to use castor oil in a motor without making sure that it is pure. A simple test is to place a sample of the oil, with five times its volume of 90 per cent. alcohol, in a graduate, and at a temperature of 62 degrees Fahrenheit, corresponding to about 17 degrees centigrade, observe the result; if the solution remains clear and brilliant, no substantial adulterant is present. If the solution riles up, it is not pure. This is the Finkener test for the quality of castor oil. If the oil is not colorless to begin with, it is not worth while to test it at all.

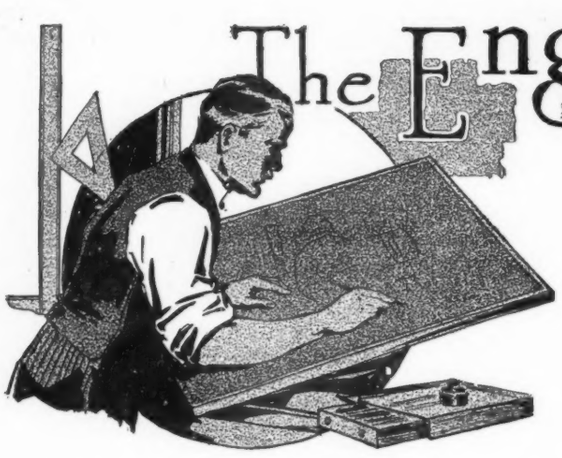
The best grades of castor oil are cold pressed from the castor bean. Chemical processes of extracting the oil are prone to leave substantial traces of free acids of refining. In the process of extracting the oil from the bean, in addition to getting all of the oil out of the same, removing the albuminoids, is needed.

Oil Tests—In the movement which is now under way to remove from the automobile the last vestiges of offensiveness in the street traffic, systematic investigation of lubricating oils has been taken up with so much more vim as the same line of research promises to remove also the last uncertainty in the control of the thermic functions of the internal combustion motor. The most important work looking to the avoidance of nauseous odors in the exhaust gases of the automobile has been done by the Royal Prussian Bureau for the Testing of Materials and showed that, by first removing those components of the oil which are soluble in acetone, odorous exhaust was obviated. Another important step was the construction of the Ossag oil-testing machine by means of which the physical properties may be determined. It has been introduced in England under the name of the Sternol machine and has already been used in an extensive series of tests.

TABLE A—ANALYSES OF AUTOMOBILE CYLINDER OILS—BY W. JONES

No.	Specific Gravity	Specific Viscosity at 80°F.	Specific Viscosity at 212°F.	Carbon	Flash Point, °F.	Fire Point, °F.
1867	0.8684	1.7647	1.1428	0.30%	325	358
1868	0.8981	3.2353	1.3214	0.70	384	432
1869	0.8992	4.1764	1.3571	0.75	404	460
1870	0.8948	6.1764	1.4285	1.03	422	474
1890-a	0.8755	5.7657	1.4285	0.80	458	504
1890-b	0.8651	3.8571	1.3035	0.72	448	510
1894-a	0.8985	3.5714	1.2857	0.95	408	454
1894-b	0.9103	4.4643	1.2500	1.70	428	474
1896-a	0.8860	2.2500	1.3214	0.65	420	476
1896-b	0.8866	3.6428	1.2500	1.00	424	476
1896-c	0.8868	4.4071	1.4285	1.10	428	478
1896-d	0.8874	6.3214	1.4285	1.10	428	490
1896-e	0.8976	18.6071	2.0000	2.35	454	526
1897	0.8747	3.8571	1.4285	0.44	438	494
1914-a	0.8953	5.1428	1.2857	0.520	412	464
1914-b	0.8756	4.1085	1.3571	0.70	434	490
1914-c	0.8801	7.5353	1.5357	0.93	450	506
1934	0.8705	3.3928	1.2143	0.55	440	494
1935	0.8777	3.5714	1.2500	0.78	438	486
1936	0.8738	3.5714	1.2500	0.53	442	494

In articles to appear later we will analyze and enlarge upon these analyses.



The Engineers' Forum

Discusses Contet's Formula for Counter-Springs—Analysis of Problem

Forrest R. Jones, Knoxville, Tenn., Sets Forth His Views on Them

KNOXVILLE, TENN.—Editor THE AUTOMOBILE:—Relative to the abstract and discussion in THE AUTOMOBILE of September 26, of Mr. Contet's article on Counterspringss:

While teaching in different universities several years ago, the formula of which Mr. Contet has given a development was used whenever occasion called for it. My development is thought to be somewhat simpler and possibly more readily understood.

A specific numerical example of a compound spring made up of two simple springs which are exactly alike may serve to primarily give a clear conception of the action of such compound springs.

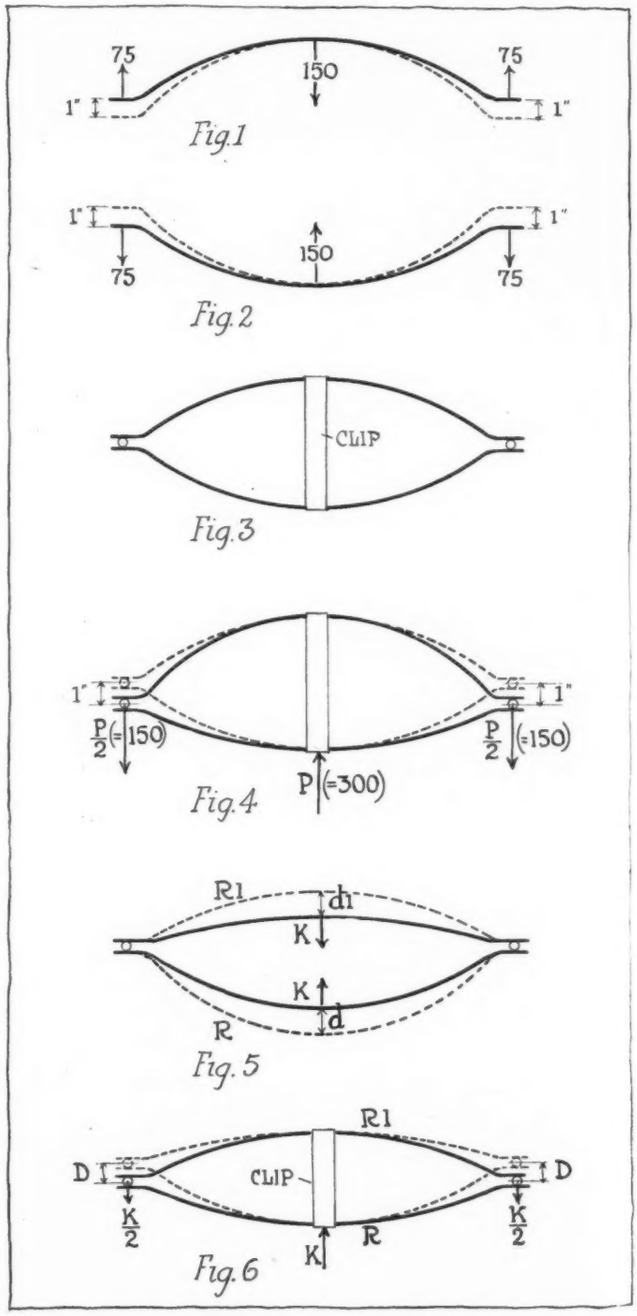
In Fig. 1 a simple spring is shown acted upon by a force of 150 pounds at its middle, and by the corresponding forces of 75 pounds each at the ends of the spring. The solid curved line shows the form of the spring while stressed by these forces, and the broken line shows the form which the spring takes when unstressed. The ends of the spring are deflected 1 inch from the unstressed position by the applied forces.

In Fig. 2 another simple spring exactly like the first one when turned upside down is shown similarly with forces of the same magnitude as before, but applied in opposite direction.

In Fig. 3 the two springs of the preceding figures are shown placed together while still deflected by the forces and with a clip over them to hold them in their deflected, or stressed positions. A small roller is shown between the springs at each end. These rollers are added merely as a convenient aid in the description of the action of the compound spring formed by placing the two simple ones together. The tension in the clip is 150 pounds, and each half of the spring is deflected 1 inch from its unstressed position. The pressure between each roller and the corresponding end of each spring is 75 pounds.

In Fig. 4 the compound spring of Fig. 3 is shown by solid lines in the form it takes when a force P, which may be considered as the pressure of a car axle against the spring, acts upward against the middle of the lower half of the compound spring, and the corresponding forces, each having the value P/2, act downward on the rollers between the ends of the component simple springs. The two forces, each equal to P/2 and together equal to P, may be considered as the load that is applied to the compound spring. The broken lines represent the form of the compound spring before the load is applied, which form is the same as in Fig. 3.

The deflection of the loaded compound spring in Fig. 4 is 1 inch from its unloaded position. The movement of the compound spring while being thus deflected increases the deflection of the lower half, but allows the upper half to recoil to its unstressed form corresponding to that of the broken line in Fig. 1. In order to deflect the lower spring 1 inch, the pressure of each roller against the corresponding end of the lower simple spring must be increased by the amount of 75 pounds (since the flexibility of the simple springs is such that 75 pounds at each end cause a deflection of 1 inch). Before applying the load to the compound spring the downward pressure of the upper simple spring against each of the two rollers was 75 pounds, but after the deflection of 1 inch there is no pressure of the upper simple spring against the rollers. Therefore 75 pounds of each force



Figs. 1, 2, 3, 4, 5 and 6

P/2 are required to keep the pressure of each roller against the corresponding end of the lower simple spring the same in amount after deflection of the compound spring as it was before applying the load.

In order to obtain the required increase of 75 pounds pressure of each roller against the corresponding end of the lower simple spring, the force P/2 must be 75 + 75 = 150 pounds. The corresponding value of the upward force P, at the middle of the compound spring, is of course 300 pounds, which is the amount of the load applied to the compound spring to deflect it 1 inch. The deflection of the compound spring for a load of 150 pounds is 1-2 inch, since the deflection is proportional to the load, for a load not greater than 300 pounds.

The flexibility of the compound spring composed of the two like simple springs is therefore only one-half as great as that of one of the simple springs when the load is applied as shown.

If the two simple springs were used as an elliptic spring, the clip then not being used, the deflection for a load of 150 pounds applied at the middle of the upper simple spring would be 2 inches, in which case the flexibility is four times as great as when one of the simple springs is used as a counterspring and the load applied as in Fig. 4.

If two simple springs like that of Fig. 1 or Fig. 2 are placed side by side so that the load is divided equally between them, then a load of 300 pounds will deflect them 1 inch from their unstressed position, and a load of 150 pounds will deflect then 1-2 inch. When used in this manner the two simple springs together have a flexibility equal to that of, and are twice as strong as the compound spring with the load applied, Fig. 4.

Now taking up the more general case as discussed in THE AUTOMOBILE:

In Fig. 5 two simple springs, R and R_1, are shown as elliptics, with rollers between their ends for convenience of discussion, as before. The solid lines show the positions of the two simple springs when each is subjected to a force K as shown, and the broken lines represent the positions which the springs take when no bending forces are applied to them.

In Fig. 6 the broken lines have the same form as the full lines in Fig. 5. These two broken lines, Fig. 6, represent the positions of the two simple springs, R and R_1, when bound together by a clip which holds the simple springs bent to the respective amounts, d and d_1, and when no load is applied to the compound spring. The solid lines in Fig. 6 represent the position of the compound spring when deflected by a load K, half of which is applied to each of the rollers.

In order to deflect the lower simple spring R to the amount D from the broken-line position of Fig. 6, the sum K/2 + K/2 = K of the pressures of both rollers against the lower spring must be increased by the amount $\frac{D}{d} \times K$. The accompanying recoil of the upper simple spring R_1 to the same amount D corresponds to a decrease of the sum K of the pressures of the ends of the upper spring against the rollers to the amount $\frac{D}{d_1} \times K$.

The required increase, $\frac{D}{d} \times K$, of the total pressure against the ends of the lower spring R is equal to the difference between the applied load K and the decrease $\frac{D}{d_1} \times K$ of the sum of the pressures of the upper spring R_1 against the rollers.

Accordingly,

$$\frac{D}{d} \times K = K - \frac{D}{d_1} \times K$$

whence,

$$\frac{D}{d} = 1 - \frac{D}{d_1}$$

$$\frac{D}{d} + \frac{D}{d_1} = 1$$

$$\frac{Dd + Dd_1}{dd_1} = 1$$

$$D \frac{d + d_1}{dd_1} = 1$$

$$D = \frac{dd_1}{d + d_1}$$

or,

$$D = d \frac{d_1}{d + d_1}$$

The value of the last fraction is less than unity, since the numerator d_1 is smaller than the denominator $d + d_1$. Therefore, the value of D is always less than that of d.

If the applied load is taken as 100 kilograms, and the corresponding respective deflections as Y, y and y_1, as is done by Mr. Contet, then the equation corresponding to the first one of the last group is:

$$\frac{Y}{y} \times 100 = 100 - \frac{Y}{y_1} \times 100$$

which reduces to the form

$$Y = y \frac{y_1}{y + y_1}$$

The last equation is the same as that obtained by Mr. Contet. —FORREST R. JONES.

Note—Mr. Jones assumes that the load K produces the deflection D in the compound spring RR_1; next he reasons that to produce this deflection in the lower spring R alone the load must be $\frac{D}{d} \times K$; next, that the pressure or load required for producing the deflection D in the compound spring is smaller than that required for producing it in the lower spring alone; less by $\frac{D}{d_1} \times K$; and so far he is in full accordance with the data. This last and correct assumption, however, means just exactly the opposite of his final result; for, if the load required for producing a given deflection (D) is smaller for the compound spring RR_1 than for the simple spring R, then the former is the more flexible of the two. And the final result of both Mr. Contet and of Mr. Jones is that the compound spring is less flexible, that D is smaller than d.

The error lies in the application of the mathematics. Up to the point of formulating the equation

$$\frac{D}{d} \times K = K_1 - \left(\frac{D}{d_1} \times K\right)$$

there is question of numerical values for the deflections only, but the moment Mr. Jones says: "Accordingly" followed by the above equation, this condition of the inquiry is changed. The object is now to determine a deflection operating in a certain direction, namely, from the load toward the ground. In this deflection of the compound spring, toward the ground, the tension of spring R and that of spring R_1 are both involved, but these forces work in oposite directions. If the load applied to overcome the tension of spring R is considered positive then the load required to overcome the tension of spring R_1 must be considered negative. As the equation is formally correct, however, one can work with it so long as one remembers that d_1 is in reality a negative quantity in so far as it is used for determining the deflection D of the whole compound spring. The final equation

$$D = d \frac{d_1}{d + d_1}$$

can therefore be accepted if it is understood that the value of d_1 is negative. Now, with d_1 negative, the final conclusion of Mr. Jones as well as of Mr. Contet falls to the ground. The value of the last fraction is NOT less than unity, and D is NOT smaller than d. In other words, the flexibility of the compound spring is greater than that of the simple spring R, which was also the first assumption of Mr. Jones, although by putting it into equations he afterwards made it contradict itself.

The error in Mr. Jones's reasoning is exactly of the same nature as that which was pointed out in Mr. Contet's develop-

(Continued on page 907)

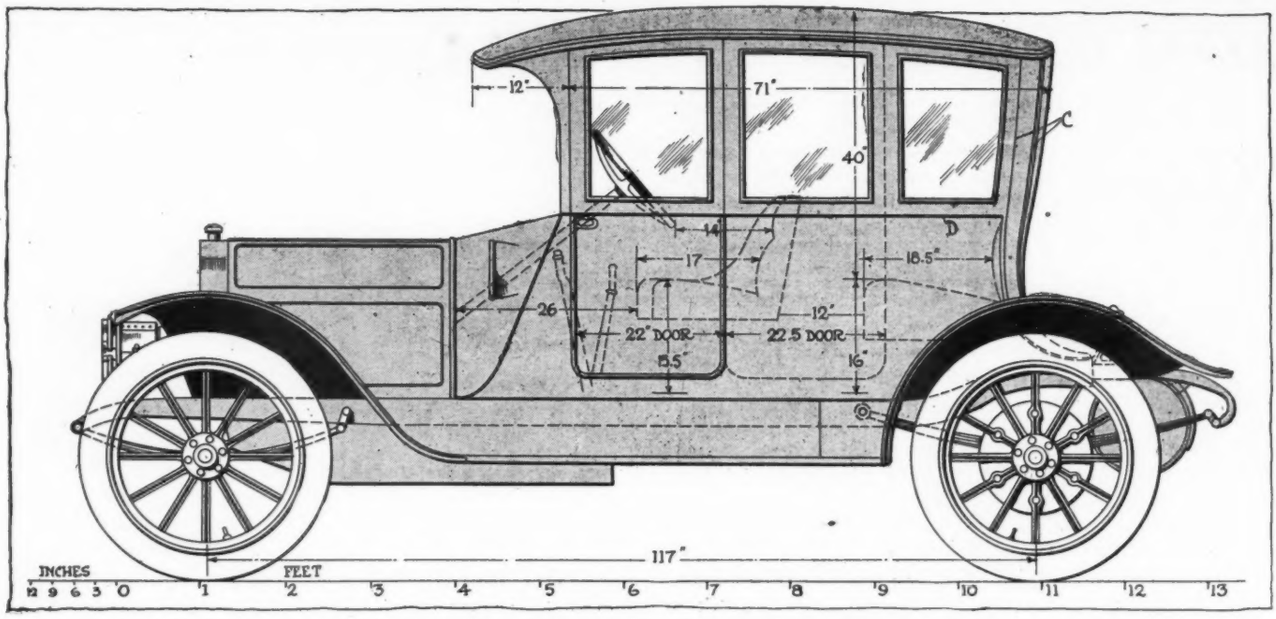


Fig. 1—Side view to scale of coupé design adapted to Hudson 37 chassis

Four-Passenger Hudson Coupé Design

Body Designer Utilizes Hudson 37 Chassis and Makes Few Changes—Drawings and Plans Drawn To Scale

By George J. Mercer

IN continuation of the plan mentioned in the last issue of THE AUTOMOBILE, the accompanying illustrations show another design of a closed body suitable for use on a medium-powered car. This design is totally different from the one preceding; it is made to carry four passengers, including the driver. There are two seats, and each seat is comfortable for two people, and the doors for entrance are offset, that is, not in line across the body; the one on the left side is forward and is used for entrance to the front seats and that on the right side is toward the rear and is used for entrance to the rear seats, the width of the door openings is, respectively, 22 and 22 1-2 inches and is so indicated on Fig. 1.

Allowance for the individual tastes and requirements of the customer is becoming every day a more important part of the duties of the automobile salesman. Close competition in the trade caused by the advance upward of the standard of the popular-priced car has made it possible for the public to become more dictatorial and the desires of the customers are acceded to as far as the selling profits of the business will permit.

The buyer who is able to purchase an article costing from about $2,000 and up is not willing to be treated collectively and this trait in human nature is well understood and provided for by the successful salesman. As a rule, the changes suggested by a customer are made in good faith; it is the critical buyer who forces up the standard and the reform work of the particular person benefits all that come after. Style and appearance count largely in determining a purchase.

This body design is unique in that a straight-line effect is obtained in combination with the arched roof and the ogee sweep of the back line, Fig. 1, the exterior or border lines of this body all show a curve that combines with the curves of the mud-guards, yet the straight lines of the belt, the window lines and the cowl hood give the body a severe tone and the rear view, Fig. 4, is made to carry out this same design.

The body is illustrated mounted on a Hudson-37-1912 chassis, 118-inch wheelbase, 36-inch by 4-inch tires, and as the body will weigh when finished ready to mount approximately 650 to 700 pounds, it will come well within a reasonable limit to mount on a standard chassis. The design is made to harmonize with and utilize the standard mud-guards, lamps, tire holders, etc.; the electric lighting system as regularly provided will furnish current for the dome light in the roof and the standard dash lamps can be inserted in the recessed pockets of the cowl hood, Figs. 1 and 2. The extra tires are carried on the right side on the running-board; this is the position provided for on the standard car and by retaining this place the regular equipment for holding the tires can be utilized and the offset body doors permit of this selection. This utilization of the standard parts of the car as far as the harmony of design will permit will help out in the final cost more than the actual saving in money, because a commercially-purchased article will be cheaper than one specially designed.

The change-speed and brake levers on the standard chassis are located, for convenience of operating, inside the standard foredoor body and the body design illustrated is wide enough to allow ample room for these levers and also hand clearance around the steering wheel. The plan view, Fig. 3, will give the thickness of the framing, which will equal the inside of the framing at a point opposite the steering wheel. Measured in this way, the hand clearance is approximately 2 1-2 inches, and, as the wheel is above the framework and opposite the glass, the hand clearance will be even greater, or approximately 3.5 inches.

The body is made to cover the entire length of the frame back of the hood and without having to add the customary box at the rear. The actual body length inside is short for a four-passenger job, yet plenty of room is allowed for all seatings; this is accomplished because the 22-gallon gasoline tank is at the rear of the chassis and outside the body lines and the space under the front seat is utilized for foot room for those seated

at the rear. The space allowed between the back of the front seat and the front of the back seat is only 12 inches, Fig. 1, but the maximum entrance from the doorway to the rear seat is obtained by tilting the back of the front seat forward as indicated in Fig. 1, and the full complement for the seating of those occupying the rear seat is the utilization of the space under the front seat for foot space.

It might be added that the location of the doors in the design is not arbitrary, the door on the left side can be placed opposite the right side one, but as it will necessitate lifting up one side of the front seat to pass forward and as there will be two doors, the design will certainly appeal to many customers.

The principal dimensions of the body sizes, doors and seating arrangements are indicated by figures on the drawings, and these proportions are ample for the average person.

Ventilation is by a shutter at the offset part of the body at the front, indicated in Fig. 1, a long, narrow shutter with provision for operating from the inside is placed at each side at the point above mentioned, and the cowl, which is graduated from the hood to the body, is provided with recessed pockets for the electric lamps, and at the top is a glass panel E, Fig. 3; this panel is serviceable to light up under the cowl and permit the reading of indicators on the dash, etc.

Locker space is under the rear seat and at the each side under the cowl at the front. The side windows are made to drop full length and are of 1-4-inch plate glass without wood frames. They shut out the rain when raised by setting over the guard rail on the middle bar. The rear window is stationary. The front glass is made with rain vision and swings outward like the conventional windshield for this style of body.

The construction of the body is reasonably simple, the lower sides, back and door panels, also cowl, are made from 16-gauge aluminum; the panels are shaped and fastened at the rear to the wood corner pillar, and the edges covered with metal molding, as illustrated in Figs. 1 and 4; at the front the side panels terminate as shown in Fig. 1, at this line they turn at right angles to the side surface, with the angle of turn slightly rounded and at the intersection with the cowl the panel is stopped and fastened.

The rear corner pillar is made to form the slight rounded corner, Fig. 3, and no metal is used to cover the wood forming the round. The upper panels are .375-inch whitewood and are glued to the rear pillar and the framework, the lower edges of these wood panels are lapped over the top edges of the aluminum lower panels 1-4 inch and rounded over to give a molding finish. The line of demarkation on the lower finish line of the wood panels on the sides and back is marked D, Figs. 1 and 4. C, which is indicated in like manner on the same two figures, shows the terminating line of the wood panels, back and sides, where they lap over on the corner pillar; these panel edges are made to continue the line of the metal molding up the corner pillar, and the lines C show a molding finish up the whole length of the pillar and the rounded part of the pillar in between these lines show a recessed effect.

The body framing is of good ash and the roof of the regulation laminated whitewood or pine sheathing. The method of framing will be such as general practice dictates. Wood panels have been specified wherever possible, because the design is special and consequently a quicker delivery can be secured if the older-fashioned methods are resorted to. Metal panels undoubtedly give better service as the outer covering on bodies to be used as automobile bodies, but occasionally there are cases where the design and construction are such that equally as good results can be obtained where part of the panels are of wood and part of metal, and it is perfectly safe to guarantee that wood panels as specified will give a good account of themselves.

The cost of a body made according to the design submitted and with a trimming, interior appointment and color specification in accord with the standard of that furnished by the car makers on their stock bodies, will be approximately $1,300 to the customer, and this should include mounting the body on the chassis. This price is a fair average and will permit the customer to select from samples furnished by the best wholesale houses of broadcloths or other suitable cloths for trimming the interior, laces for binding, carpet for the floor, silk for the curtains, toilet and card cases and a choice of the style of trimming. In regard to this latter it is generally left to the workman to use a style of trimming that will accord with the material selected.

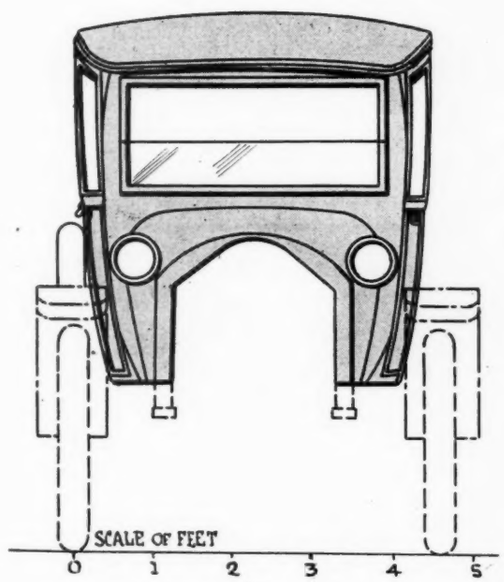


Fig. 2—Front view of Hudson 37 coupé design

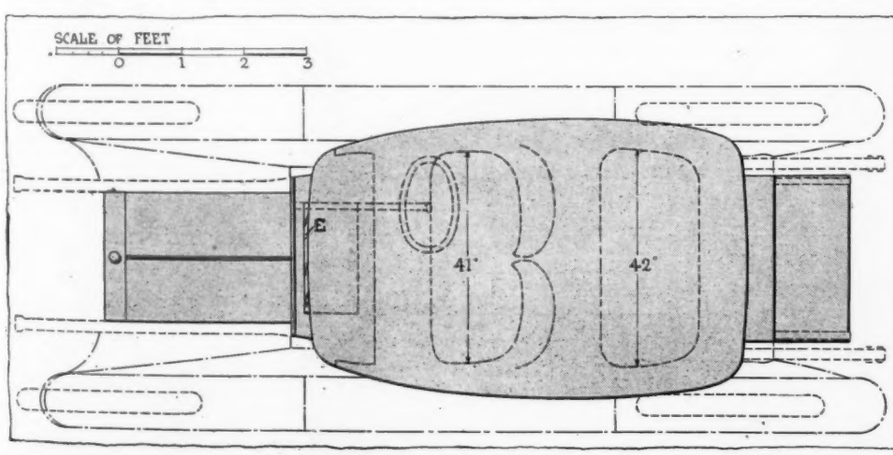


Fig. 3—Plan of suggested Hudson coupé

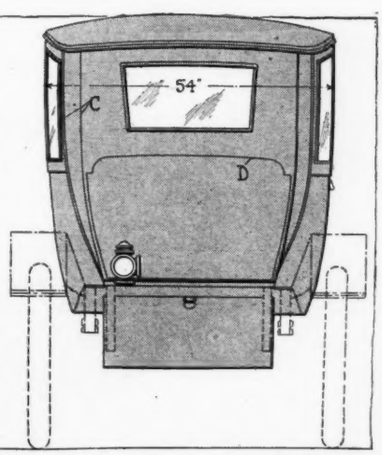


Fig. 4—Rear view of coupé

Foreign Constructions Designs and Practices

Shopman Made Practical Steel Tester—Suggested Machine for Quick Work and Reliable Results

German Factory Tests 4,000 Pieces of Steel Every Working Day in Year

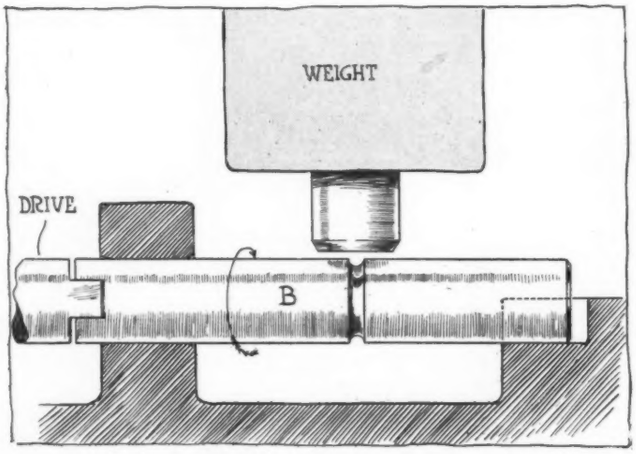


Fig. 1—Method of subjecting automobile steels to shocks to determine ultimate ability of parts in the actual car service

TESTING over 4,000 pieces of steel every working day in the year, and using the shopmen instead of the laboratory to do this testing, may seem a herculean task, but it is what is being done in one of the best European plants and it is being done well, done cheaply and is leading to excellent results.

In the majority of factories the laboratory does all of the testing of steels for use in the company's product. It determines the necessary analysis of the steel, but it has not sufficient capacity to adequately test all of these materials when delivered to the factory; this is the great present weakness of the factory laboratory and the point where there is not sufficient overlapping between laboratory and shop.

Then too many of these materials delivered as per specification at the factory have to be heat-treated after received and it is here that the real difficulties of the shopman begin: More than likely some of the material is unsuited to the actual work to be done. The laboratory merely hopes that heat-treatment will whip the material into shape. Frequently good results come through this process. But there are times when anything but a happy conclusion is reached.

Knowing perfectly well that the laboratory is not to be blamed for the practical happenings of the every-day work, the shopman struggles along under his heavy and swelling burden, or can it be said of him that he has over much time to spend on betterment plans? It may be that the shopman's failing lies in his very ability to struggle along. It might be better for him were he to take a day off occasionally and think it over; to devise means for subduing the situations which are obviously too penny-wise and pound-foolish to be tolerated any longer.

In nine cases out of ten, however, it is more a question of facilities than it is a want of appreciation of the necessity for making tests of materials to use. The shopman can scarcely be expected to have the nimbleness of the laboratory man in the laboratory. What he needs is represented by such facilities as will warn him in time of any danger to the good of his processes that may be lurking in the offing. If the danger is offset by due warning, to ask the laboratory to conduct an investigation is a simple thing to do. The real difficulties of the shop are not completely met by the laboratory. The only pleasant aspect lies in the fact that a good working laboratory reduces the actual number of the shop difficulties which come to the surface from day to day.

Remembering that all great difficulties are mastered by handling their details one at a time, what possible harm would befall the shopman who would conclude definitely to test all of the steel he might use, making a separate test for each condition of heat treatment on each grade of steel used? It might be said, what an enormous undertaking! That is exactly what shopmen did say. All of their failures are readily traced back to this simple statement. **After all it is not such a large undertaking as it looks.** There is one plant wherein an average of over 4,000 determinations are made on steel every working day in the year. The men who make these determinations enjoy every minute of the work. That it pays to make them is a proven fact, indeed, it would not be possible to get on without doing this work. The quality of the product has grown to the point of demanding just this painstaking care in the process.

It has been found that a simple shock-bending test on a test bar of steel, if the process of test is systematically made, develops faults, if they exist in the steel, very promptly. Fig. 1 indicates to a shopman how he can rig up a test of this sort. The test-bar B of the steel to be investigated, is turned down to some convenient size as: Diameter of round section, .47 inch; length between supports (5 diameters) 2.36 inches, and length over all to suit testing machine.

The bar is notched at the middle by a round nose tool to a depth of say 1-8 inch. The important point is to make all test-bars the same size and to have the notch uniform between them. The next step is to provide a falling weight and a means for rotating the test bar so that it will always be rotated an exact number of degrees for each blow struck by the falling weight. In this class of tests it is the custom to rotate the test bar either 90 per cent. or 180 per cent. for each blow struck. The force of the blow must be regulated depending upon the time that can be allowed in making the test. The great question in practice is to adopt a uniform system and to subject all test bars to the same uniform practice. It is not actually necessary to know just what the force of the blow is so long as the same force, under identical conditions, is suffered to play against all test bars used. In the plans of testing it is purposed to so weight the hammer and regulate the diameter and notching of the test bar

as to bring about destruction of the test bar within a short time. It would be a small item in point of first cost to rig up a battery of these hammers and provide means for changing speed of blows, and rotation of the test bar would suggest itself to the operator. In the Krupp motors at Essen, where these tests were examined, it was found that the persistance of the steel depended upon its quality. Time and experience with the trip hammer method has enabled the operators there to judge very quickly whether or not a given heat of steel is worth duplicating.

These little testing machines are very noisy. To put up with them it is necessary to place them in a separate room to locate the room as far away from other activities as possible is good practice.

In plants which are fitted out with compressed air equipment, remembering that compressed air hammers are capable of striking blows of some force at a very rapid rate, it is more than likely that preliminary testing work might be done by this equipment. Fig. 2 suggests the idea. The details would depend upon the design and construction of the compressed air tools available in a given case. It is very possible that anyone of a dozen riveting machines now available on the market would readily serve for this class of work. These machines strike a rapid series of sharp blows. It would be a simple matter to give the test bar rotation so that the average travel would be 90 degrees of rotation of bar per blow of the hammer. A properly sized notched test bar would show fatigue very quickly under this treatment.

It is speed of test that the shopman must have. He cannot wait for a week to get results. There would be a certain indefiniteness about the results in an attempt to make a statement, but this point would be submerged in the general accuracy of comparison which is all that practice demands. If a steel comes up to the sample furnished by the laboratory for a given grade of steel, nothing more is required. If it is desired to get finer readings for purposes outside of shop practice, it is time to call upon the laboratory for work to be done. With means for testing, to turn out bars of the several classes of work passing through the plant would necessarily have to be made a routine matter.

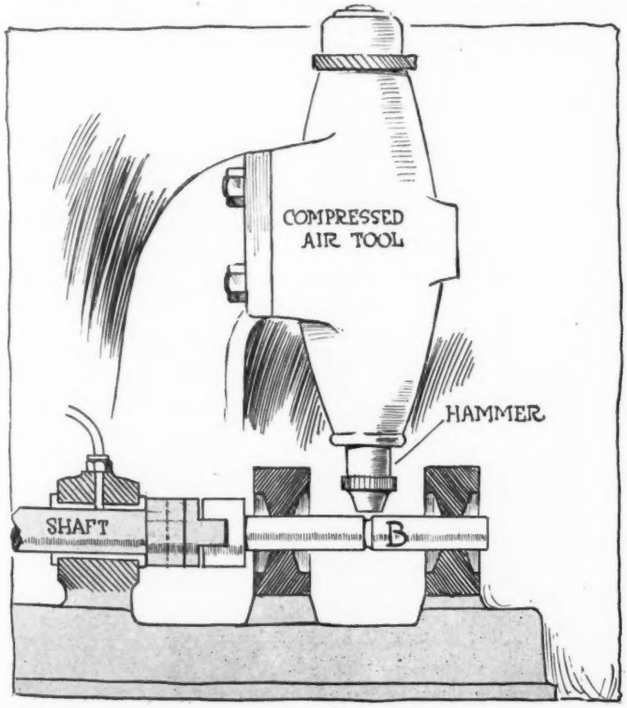


Fig. 2—Compressed air tool for use by workman in shop testing of steel to get reliable and quick results

Harking Back a Decade

What the Motoring Publications of 10 Years Ago Had To Say on Live Matters of the Day

FROM *The Automobile and Motor Review,* October 25, 1902: The progress made by the automobile since 1895, when the first of the American endurance runs was held, is shown by the percentage of starters that finished in each event of the kind. In 1895 there were two runs; in 1901 there was one and the recent tour of the Automobile Club of America to Boston and return was the fourth. The results are indicated in the following tabulation:

Date	Distance	Starters	Finishers	Per cent.
1895	38	5	1	20
1895	39	7	3	43
1901	394	78	41	53
1902	488	75	68	90

The Chicago Automobile Club gave its twice-postponed race meet at the Harlem race track last week. The attendance was small and the contesting fields very thin. Nevertheless the Peerless Yellow Kid and the Winton Pup in addition to about a dozen locally owned cars performed creditably. The track was so slow that the best time made was just under 1:30 for the mile.

Automobile exports in August reached a total of $71,907, against $56,300 during the same month of 1901. During the first 8 months of the fiscal year the exports were $786,137 against $128,702.

Albert C. Bostwick is demonstrating the first model of the new Pan-American car which is made at Mamaroneck. The motor, body and many if not all of the mechanical parts are imported and the justification for the name lies in the fact that they will be owned by Americans. The car has a motor with four cylinders and is rated at 40-horsepower. The mechanism resembles that of the Mercedes but in appearance the car is more like a Mors.

The effect of the long, novel, orderly and interesting procession during the Automobile Club of America run to Boston upon the average citizen could not fail to be of the best. It is likely that the run has done much for the interests of motoring throughout New England. To the country at large, as informed by the press, the run has given good evidence of the practicability of the automobile in actual road use.—*Editorial.*

The Cleveland Automatic Machine Company, a New Jersey corporation capitalized at $850,000, is preparing for business. A. L. Garford is president and it has been announced that $150,000 of the capital will be used in Ohio. The company was formerly known as the Cleveland Machine Screw Company. Mr. Garford is also president of the Federal Manufacturing Company, of Elyria, O.

The National Association of Automobile Manufacturers has has made preliminary plans for the automobile show will be held in connection with the Louisiana Purchase Exposition at St. Louis in 1904. Manufacturers are invited to send in applications for space as soon as possible. No space charge will be made against exhibitors and a reasonable amount of electric power for lighting the displays of the exhibitors will be furnished free.

The annual automobile show which will be held in Paris next season promises to set a new mark in the growing industry. The show will be much larger than ever before and a number of American manufacturers will be represented. Special efforts are being made by the management in connection with the National Association of Automobile Manufacturers to secure a large American representation. The foreigners, on their part, are planning to show at the St. Louis fair.

What to Do With Your Tires in Winter; Trouble With the Oiling System; Principles of the Claudel Carbureter; Advantages of Air Substitutes; Quick Blowout Explained; Alignment of Drive Mechanism

Winter Care of Tires

EDITOR THE AUTOMOBILE:—I want to jack up my car for the winter; is it necessary to remove the tires?

I would like to offer a suggestion in the way of carrying tire chains. Several times I have noticed that it took me a considerable time to put these chains on because I had not taken sufficient care in putting them away and the links stood up on end at the time and had to be pushed in place before stretching the chain over the tire. If the chains are laid carefully on the ground first and then doubled over, Fig. 7, and placed in a bag it will save a lot of time in trying to put these on in the wet.

Germantown, Pa. FRED MARSHALL.

—It would be better to remove the tires because they can be taken care of more thoroughly. The United States Tire Company gives the following advice for the winter care of tires: In laying up a car the tires should be removed from the rims and washed thoroughly with soap and water. They should then be carefully wrapped in strips of paper or cloth and stored in a dark place which is kept as nearly as possible at a temperature of 50 degrees.

If the tires are to remain on the wheels for a considerable length of time while the car is out of service the wheels should be jacked up and only about 5 pounds of air left in each tire. This keeps the tubes in shape and also preserves their softness and pliability. When the wheels are not jacked up and the car is allowed to stand for any length of time the tires should be kept well inflated and the car moved occasionally so that the tires will not flatten from standing too long on one spot.

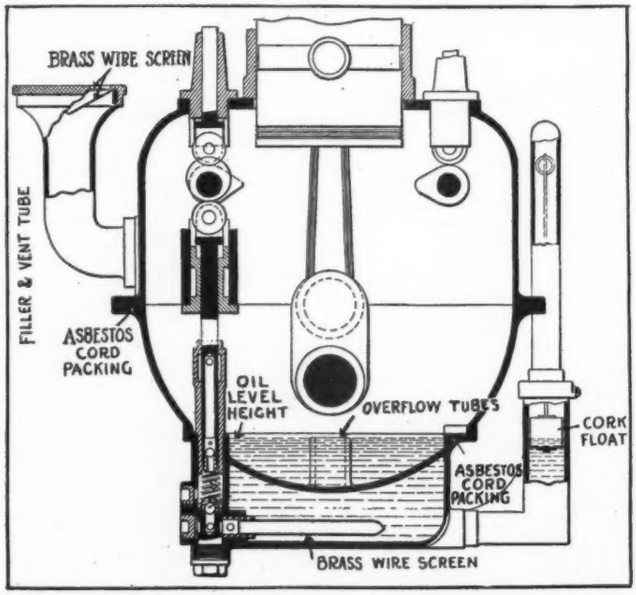


Fig. 1—Section through the Ohio crankcase, showing oiling system

Oiling System on Ohio 1911

Editor THE AUTOMOBILE:—I am running a 1911 Ohio touring car and I am troubled lately by smoke. Would you please tell me if this is due to a defect in the oiling system or what the cause can be. Of late I am also troubled by a large carbon deposit in the two front cylinders. Is this due to the same cause, do you think, or some other?

Saginaw, Mich. OHIO.

—The Ohio motors are lubricated by a system which is contained almost entirely in the crankcase. The oil reservoir, Fig. 1, holds about a gallon of oil, is located in the lower half of the crankcase. The oil may be put into the reservoir in two ways: by pouring it through the breather tube or into the filler pipe which is located on the side of the motor. Within the base of the crankcase and extending vertically there is a plunger pump, driven by means of an eccentric off the camshaft. This pump takes the oil from the base of the reservoir through a strainer tube projecting laterally into the reservoir and forces it up into the upper part of the lower half of the crankcase. This part of the crankcase contains a number of troughs into which the oil is fed by the pump in sufficient quantities to keep them constantly filled to such a height that a proper dip of the connecting-rod into the oil will take place.

There is one of these troughs to each cylinder. As the rapidly revolving connecting-rods are whirled into the oil pools contained in the splash troughs they churn the oil into a vapor which fully envelops the crankcase and lubricates every moving part contained therein. This includes the cylinder walls, connecting-rod bearings, main bearings, camshaft bearings and cams.

After lubricating all the bearings the oil will drain back into the bottom of the crankcase and will pass through the system again, after being strained. A constant level throughout the crankcase is maintained by means of partition walls placed laterally across the crankcase between each pair of cylinders.

Worn piston rings in the two front cylinders is no doubt the cause of your trouble. If you will renew the rings there is no doubt that both the smoking trouble and the carbon will disappear as the oiling system is automatically taken care of and will not change if once adjusted correctly.

Information Wanted on Claudel

Editor THE AUTOMOBILE:—Would you kindly tell me where I can get information and prices of the Claudel carbureter in this country.

Newport, R. I. H. W. BENTLEY.

—The Claudel carbureter is shown in section in Fig. 5. It is of the eccentric float-feed type, so called because the float has not the same axis as the jet. The carbureter is hot water jacketed about the mixing chamber and so arranged that the air is taken both through and around the jet. A tube surrounds the gasoline lead to the spray nozzle and is pierced by holes at the bottom and top. The air passes into the lower holes in the tube and comes out through the upper ones which surround the spray nozzle. Easy starting is obtained with this starter by fitting a

shutter into the air channel which permits the suction of the motor to fall upon the jet, thereby securing a very rich mixture for starting purposes.

This carbureter is not handled in this country at the present time, but full information may be had concerning it by addressing the Claudel Carbureter Company, 41 Rue des Arts, Seine, France.

Advantages of Air Substitutes

Editor THE AUTOMOBILE:—Can you furnish me with, or inform me where I can obtain a list of the different varieties of pneumatic tires that have been patented?

2. What are the disadvantages of fillers for tires as a substitute for air, and do you think fillers will ever supersede air?

Chattanooga, Tenn. J. I. LEVENTHAL.

—Any patent attorney will secure this list for you at a very reasonable price. It is a matter of looking up records at the patent office and cannot be secured from them directly. THE AUTOMOBILE has no lists of these patents.

2. The most serious disadvantage under which some of these tires have labored is that the inner filler crumbled to pieces and disintegrated in a very short time. Others could not be left standing for even a short time without the tire having a flat place where it had been left standing. Still others were all very good on asphalt roads, but on other roads developed the same fault as solid rubber tires, that is, too much vibration and bad riding qualities. There are some of these fillers on the market now, however, which are said to overcome all these difficulties. They knead back together if torn apart, will not tend to flatten and are very nearly as resilient as air. THE AUTOMOBILE cannot predict that fillers will ever take the place of pneumatic tires.

Where the Power Goes

Editor THE AUTOMOBILE:—I understand that in an automobile motor that very little power is actually exerted by the road wheels in propelling the vehicle after it once attains a uniform speed on level ground. Take a motor which develops a certain horsepower when turning at the number of revolutions required to propel the vehicle at a given speed. This motor uses up so much fuel; now where does it go? There are a certain number of heat units in each gallon of gasoline. This is converted into useful work to some extent, while most of it is lost because of the inefficiency of the machine. Can THE AUTOMOBILE tell me where the power that is in a gallon of gasoline goes?

Saratoga, N. Y. CHARLES DIXON.

—Your question, which is an interesting one, can be answered graphically to good advantage. In Fig. 2 is represented a gallon jug of gasoline which is fed to the motor. Of this the heat units contained in 35.9 per cent., according to tests which have been made on several different motors, is thrown away in cooling the motor; 35.2 per cent. passes out through the exhaust; 8.1 per cent. is lost through friction in the motor and in heating the incoming charge, etc. The other losses are also indicated in the illustration, which shows that on the average there is only about 6 per cent. of reserve power for the hills and for accelerating.

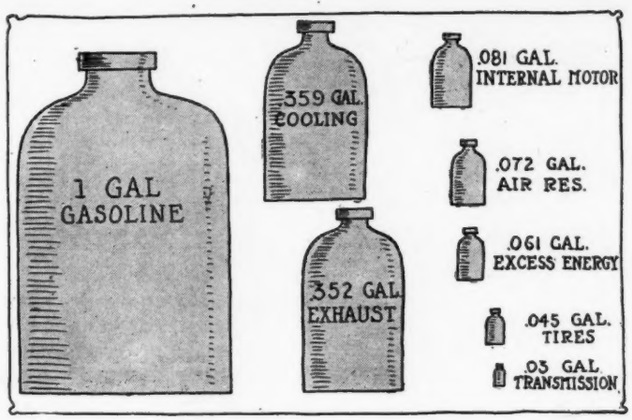


Fig. 2—Graphic representation of the various sources of power loss

Questions Regarding Comfort

Editor THE AUTOMOBILE:—1. Is it not best to run with advanced spark when car is on level road and gas throttle very nearly closed?

2. Is it not best to retard spark when pulling grade if engine begins to pound? Then will you please explain how automatic spark advance can take care of the above opposite conditions, namely, when car does not require much power, spark is advanced, throttle almost closed; next, when car calls for all the power engine has, spark is retarded, throttle is wide open.

3. I am buying new car and want to equip it with anything that will make it more efficient and more economical. The question of shock-absorbers I can't decide. I do not believe in friction absorbers, because when springs are depressed they cannot again come to normal position with friction absorbers. Hydraulic absorbers are not only very expensive, but give considerable trouble in keeping them properly adjusted to give desired results. Is there any known, actual tests that prove beyond doubt that absorbers give a tire more mileage? Which is the

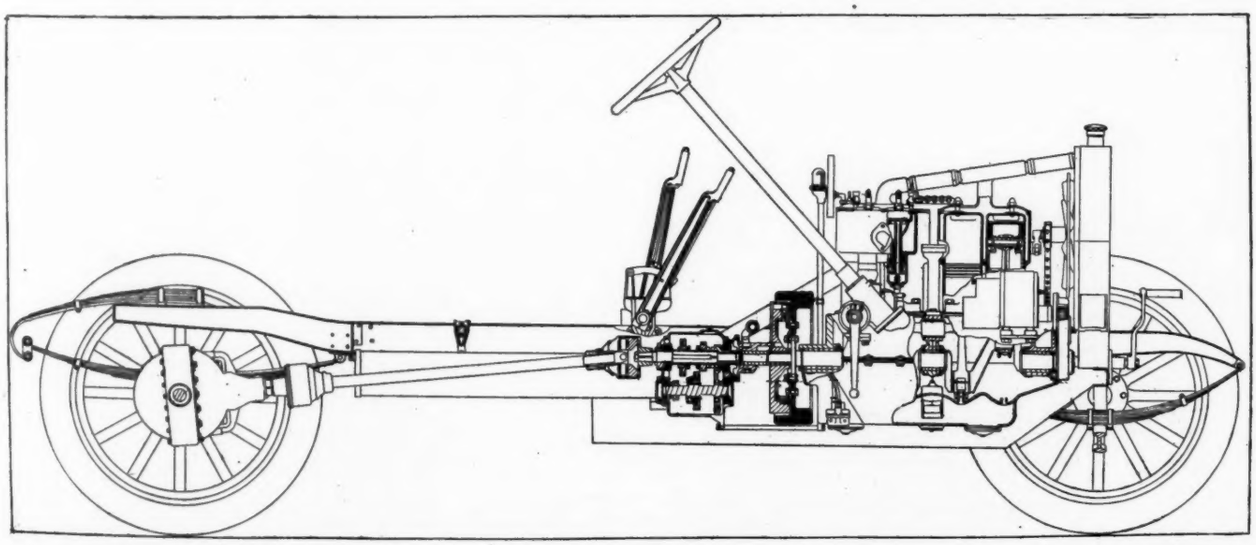


Fig. 3—Section through the driving mechanism of a modern automobile to illustrate features which take care of load changes

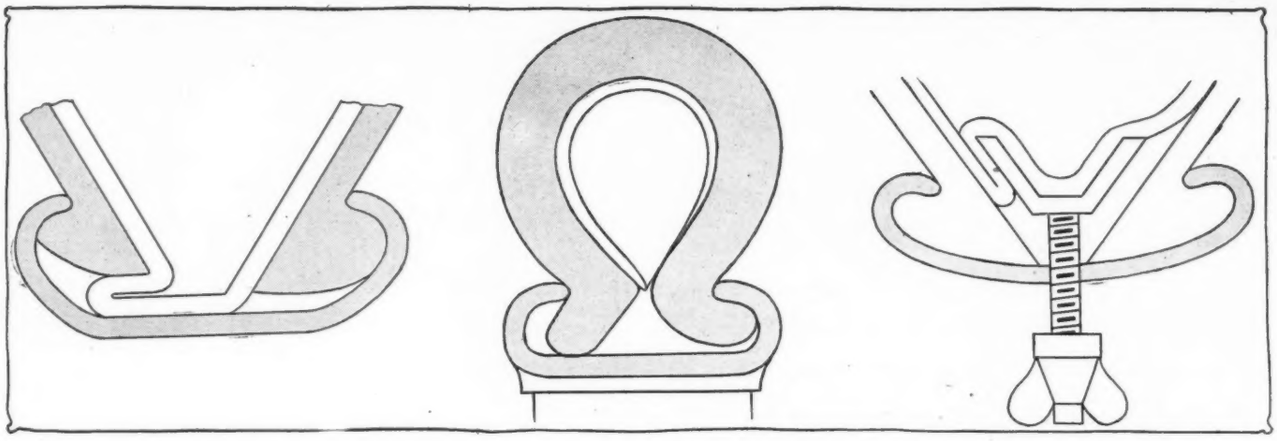


Fig. 4—Showing how the inner tube may be pinched between the bead and the casing, the bead and the security bolt or the two beads

best principle of construction for absorbers, friction or hydraulic?

4. Will you name an equipment for Overland 69 T, equipped with electric starter and lights, that you think covers everything needed for light touring that will aid comfort and pleasure, and for the best possible good of the car and tires, regardless of equipment first cost.

5. Can an electric foot-warmer be operated on a car of the above make, without injury to battery or generator?

6. If foot-warmer can be used, I take it for granted, electric stove, such as toaster, could also be operated from battery when car is standing.

7. I have used an oil heater in car with curtains all down in very cold weather much to the comfort of the passengers. Is this dangerous or not? Danger of oil exploding, I mean.

8. How can you explain that Ford cars generally give more mileage per tire, with their small tires, than most other cars do with much larger tires and in the face of the cry of tire manufacturers to use larger tires. You can put two sets of tires on Ford car for practically the same money you can put one set of 34 by 4 on a car, and if you will get up statistics you will find the two sets of small tires will give one-third to one-half more mileage. You answer, the light car, of course. Then why should not manufacturers strive to lighten up on their cars?

Inman, S. C. G. C. F.

—1. Yes, always run with the spark as far advanced as you can possibly keep it without allowing a knock to occur in the motor.

2. It is necessary to retard the spark or the motor will knock. It must be remembered that the position of the spark is governed by the speed of the motor. When the throttle is wide open and the motor is on a hill under heavy load it will be turned over slowly. The spark will therefore be automatically retarded; a feature which is just what is required or the motor will knock. When the motor is speeded up the spark is automatically advanced, generally by some centrifugal device, and the correct condition for high speed is obtained. A skilled operator can get better results with a hand advance than he can with a fixed spark or one with automatic advance, but the average operator will obtain better results with the automatic.

3. In spite of the many skeptical people the general opinion is that shock-absorbers contribute materially to the easy riding qualities of the car. That this is generally accepted is shown by the fact that the higher priced cars put them on as standard equipment. There have been no actual figures as to tire saving, but the Truffault-Hartford concern estimates it at 10 per cent.

4. The equipment furnished you with your new car besides the addition of tire chains, lap robes, three extra shoes, six extra tubes, blowout patches, warm clothing and a trunk rack will be sufficient. There are endless luxuries which could be added to this and which would no doubt add to your comfort. With this equipment, however, you would not have to struggle.

5. There are no electric heaters of which THE AUTOMOBILE has any record that could be used in connection with the generator or accumulator.

6. Perhaps a heater of this type could be used for this purpose, but the cooking would be very slow work. For a camping trip a small alcohol or oil stove in addition to the regular campfire would be much quicker.

7. An oil heater in good condition will not explode, but there is always a chance.

8. As you have stated, the matter is one of weight. The added comfort of a big, heavy car with its great roominess and luxurious upholstery and heavy motor must be paid for by the greater cost of tire upkeep and first cost. The man who cannot afford all these should be content with a small car.

Tire Blew Out Very Quickly

Editor THE AUTOMOBILE:—I had just made a tire change the other day when the very tire upon which I had been working blew out within 3 minutes after I had fixed it. What could have caused this? I am running an old-fashioned car and am using regular clincher tires.

New Haven, Conn. GEORGE WESTON.

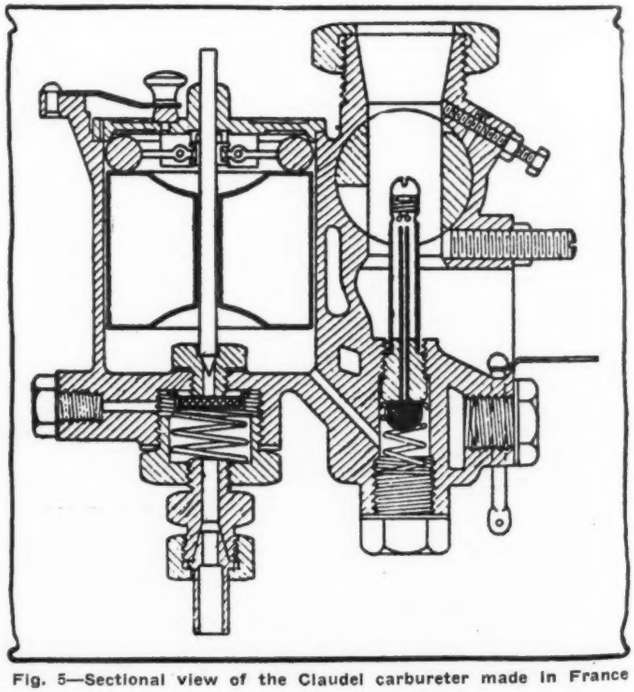


Fig. 5—Sectional view of the Claudel carbureter made in France

—This is no doubt a case of bad assembly. The inner tube became pinched between the tire iron and the rim or perhaps in one of the three ways depicted in Fig. 4. If you will take care in putting the inner tube into the casing the chances are that an accident of this nature will not occur. It is very easy, however, to have a tube blow out through not assembling it properly. When security bolts are used as they were in many of the old-fashioned tires it is easy to see the dangers which surround the inner tube. As shown in the illustration the tube may be pinched between the casing and the rim, the bolt and the casing or occasionally when the tire is underinflated between the two beads of the casing at the top of the tire owing to the tendency of the casing to spring together at the top. In springing the second bead in place after the casing and the tube are on the tire care must be used in not pinching the tube with the tire iron. Many cuts are caused this way and great care is needed in avoiding them, especially if the casing be new and stiff.

Details of Marmon Control

Editor THE AUTOMOBILE:—The spark and throttle of my Marmon car will not stay in place. The factory sent me new gears and advised me to change the springs back of the friction plunger, but after using the car for a short time they became loose. What is the cause?

New London, Conn. PHILIP MORRIS.

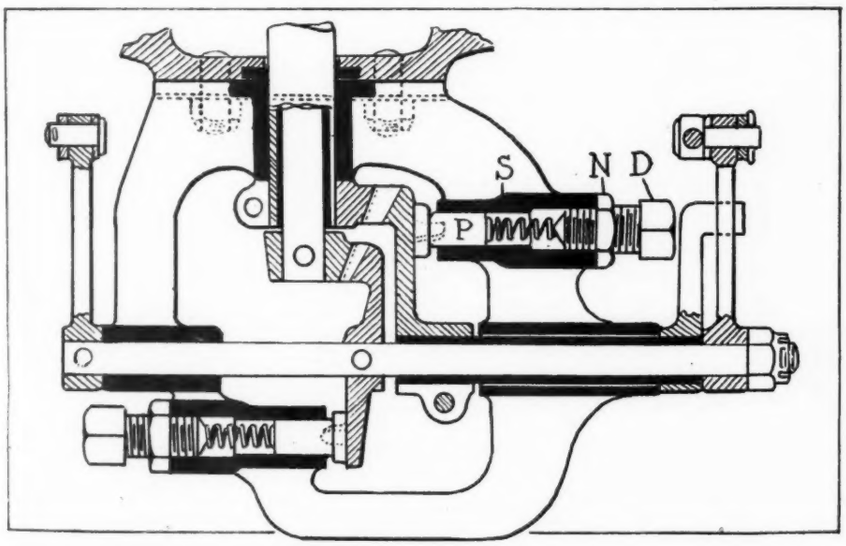


Fig. 6—Control mechanism on the Marmon with a view of the adjustments

—If you have changed the springs back of the friction plungers at the lower end of your steering columns as advised by the factory, perhaps you have not screwed in the studs D, in Fig. 6, to give the springs S the required compression. If you will adjust the springs so that the plungers T press sufficiently hard upon the backs of the gear sectors the friction should be great enough to hold your engine control levers as tightly as desired. It is possible that you have not tightened the locknuts N on the spring adjusting studs. These nuts must be tight in order that the adjustment may be maintained.

Taking Care of Alignment

Editor THE AUTOMOBILE:—What provision is made in the Haynes car for taking care of the change of alignment due to the additional weight of five passengers over the weight of the empty car. That is, if the drive is aligned for an empty car will it make a difference in the arrangement of the parts below the floor of the car if five passengers are carried? I am mentioning the Haynes cars for example as I drive one of these cars now and have owned one of the earlier models for some time. I have heard it stated that a car will have a practically straight-line drive when loaded, while the drive will not be straight when the car is empty. I should like to know what compensating device takes care of this and how it is taken care of automatically.

New York City. CHARLES ATWOOD.

—This cannot be better explained than by a section through the whole car which will show how the drive is transmitted from the motor to the wheels. In Fig. 3 this section is given. It will be noted that the motor sends the power through a clutch into the gearset. From the gearset it is transmitted through a universal joint and then back to the propeller shaft. At the rear end of the propeller shaft there is another universal joint through which the power passes into the rear axle. The rear axle shafts transmit the power to the drive wheels and it is thus that the car is driven. Now when a heavier load is placed in the car it will tend to flatten out the springs at the front and rear. This is especially so in the rear, as most of the passengers will be carried in the tonneau of the car, which is mounted practically over the rear axle. The rear of the car sinks down about the front suspension points as a pivot, although the front suspension itself will be lowered slightly. The frame carrying the motor and the gearset is a part of the main frame which carries the body. Therefore the motor and gearset will be lowered slightly in relation to the rear axle tending to bring the propeller shaft to a more horizontal position. The propeller shaft is permitted to move on account of the universal joint connection it has with the main gearset and rear axle and therefore there is a perfect accommodation for the changes of alignment. It is perfectly true that a motor car will have a more efficient drive when loaded. In fact, many of the four and five-passenger cars are designed to have a straight-line drive when loaded. This form of suspension is common in the modern motor car. It will accommodate not only for changes in the total load, but also for changes in alignment which are caused by the rocking motion of the car when striking spots on the road that cause the springs to come into sudden action.

Carbureter Chokes

Editor THE AUTOMOBILE:—When I am first starting out with my car I notice that it will start to skip if I press down quickly on the accelerator pedal. What is the cause?

C. PETERS.

N. Y. City.

—This does not show that there is anything wrong with the carbureter or the motor. The accelerator pedal should be pressed down gradually, at least until the motor has become warmed up or else the mixture will be too rich and will not be thoroughly vaporized. This, of course, causes the motor to misfire. After the motor has become warmed up, however, this should not occur and you should be able to open the throttle quickly without the motor choking or missing fire.

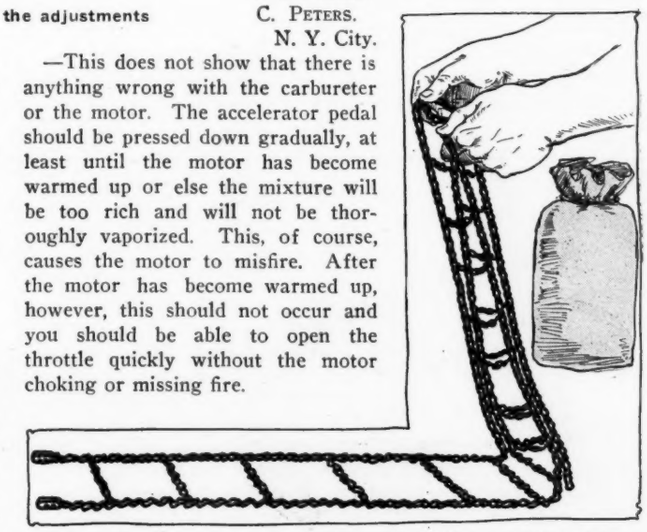


Fig. 7—How to carry tire chains so that they are always in condition

Stearns-Knight Motor Continues Unchanged

Retaining Motor Construction, Stearns Adds Six-Cylinder Model —Bodies Are of Original Design

Fours Are Fitted to Three Different Wheelbases and Sixes to Two—Complete Equipment a Feature

THE Stearns Company, which 1 year ago introduced the Knight type of sleeve-valve motor and entirely discontinued the marketing of poppet-valve types, announces for 1913 that it will build this motor in four and six-cylinder designs, and is continuing its four-cylinder motor without practically any mechanical changes. The six-cylinder model will not be announced for some weeks, but will be characterized by a long-stroke Knight engine and will be built with 134 and 140-inch wheelbases depending on the body type.

The four-cylinder model for next season is very similar in chassis design to this year's model, but fitted with a line of entirely new bodies. The chassis is made in three wheelbase lengths: 116 inches, roadster; 121 inches, five-passenger, and 127 inches, seven-passenger body. Limousine and landaulet are mounted on either 121 or 127-inch size. It is fitted with a motor of twin castings 4.25-inch bore and 5.5-inch stroke, a bore-stroke ratio of 1.29 and a horsepower rating of 28.9. This horsepower figure is claimed to be quite below the actual power generated at running speed.

The characteristic curves for this motor shown by Fig. 4 will bring out this low rating. The motor will develop this horsepower at a speed of 800 revolutions per minute, while its maximum output is seen to be about 64 horsepower at 2,400 revolutions. Naturally its torque, or turning effort, is least at this speed, being 124 pounds. The maximum torque of 181 pounds is at a crankshaft speed of about 1,100 revolutions per minute. In test, the car has required about 160 pounds torque from the motor to start, which means a horsepower somewhere in the neighborhood of 10.

Fig. 4 brings out the interesting fact that the top of the torque curve is at a higher motor speed than is common in most automobile motors. The almost straight horsepower curve is remarkable as the result of consistent valve timing at all running speeds of the motor.

Below is given a table showing the performance of the motor at different crankshaft speeds. These data were obtained on a prony brake test of the four-cylinder Stearns-Knight.

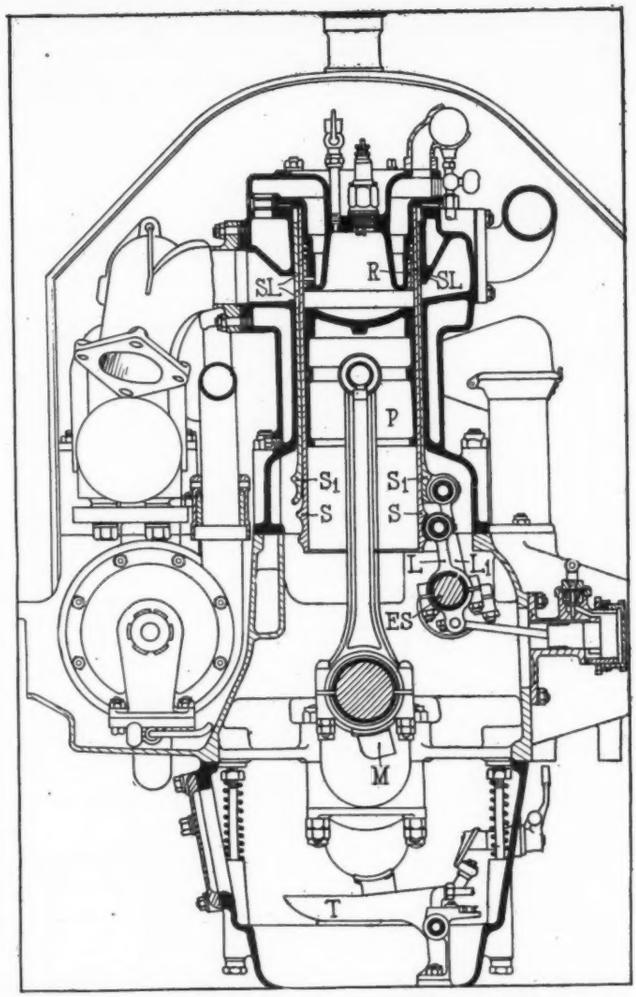


Fig. 2—Cross-sectional view of Stearns-Knight motor, illustrating sleeve construction and design of oiling system

Crankshaft speed, r.p.m.	Horsepower	Torque pounds	Crankshaft speed, r.p.m.	Horsepower	Torque pounds
400	14	168	1500	51.2	175.5
500	18	171	1600	53.3	172.5
600	22	174	1700	55.3	168.5
700	26.2	176.5	1800	57.2	164.0
800	30	178	1900	59.0	160.0
900	33.7	179.5	2000	60.3	154.0
1000	37.5	180.5	2100	61.5	147.0
1100	40.5	181.0	2200	62.7	140.0
1200	43.5	180.5	2300	63.7	132.0
1300	47.2	179.0	2400	64.5	124.0
1400	48.8	178.0			

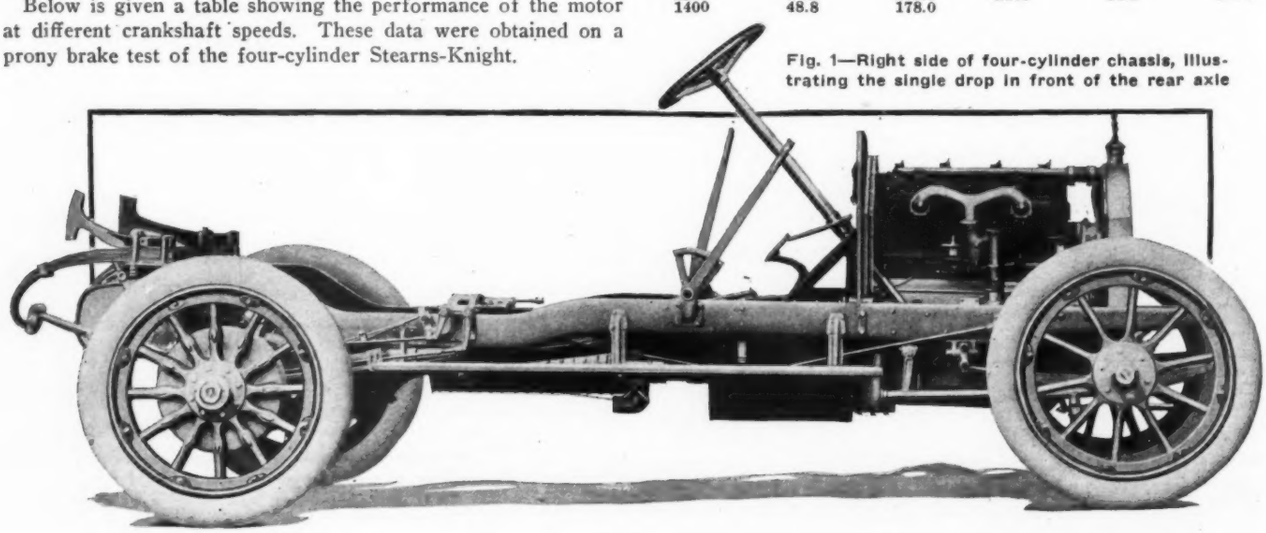


Fig. 1—Right side of four-cylinder chassis, illustrating the single drop in front of the rear axle

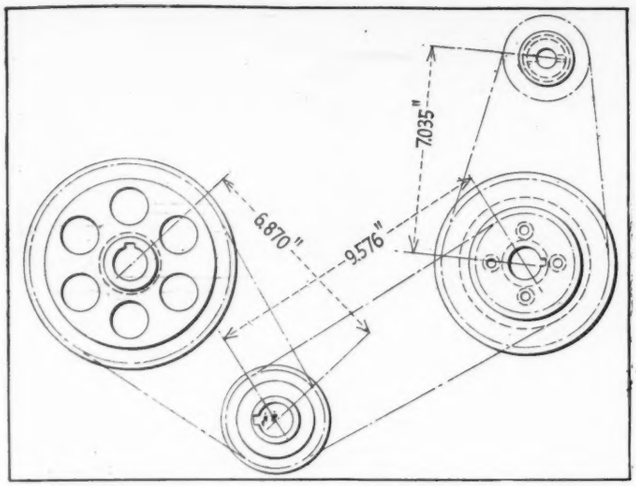


Fig. 3—Schematic view of chain drive used for actuating the sleeve-eccentric and magneto shafts

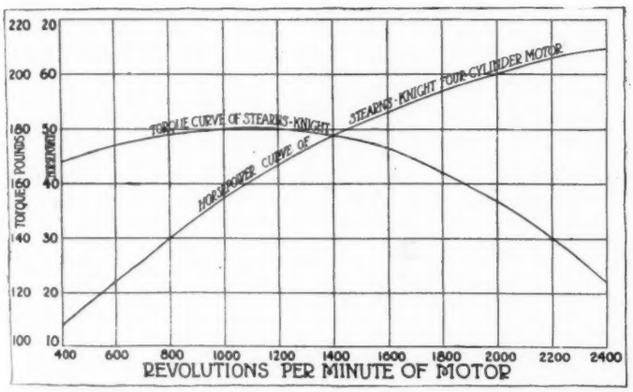


Fig. 4—Horsepower and torque curves of four-cylinder Stearns-Knight motor used in 1913 cars

In making practically no change whatever in this year's power plant, the Stearns people point out that before adopting this type of motor exclusively, their engineers made a number of improvement in it, and the performance since its adoption has been such that no material changes have been found desirable.

In fact, before finally pinning their faith to the sleeve-valve creation of Charles Y. Knight, the Stearns designers worked out extensive improvements in the inventor's conventional type of engine. These improvements were sanctioned by Mr. Knight and later adopted, at least in principle, by the Daimler, Mercedes, Panhard and Minerva concerns abroad. One difficulty which was formerly experienced with the Knight motor was to get it to idle successfully, that is, to pull evenly when running at low speed under no load. After making many tests, the Stearns engineers became convinced that the difficulty lay in the entrance of a slight amount of air through the exhaust port. This port, when not open, was thought to be hermetically sealed, but by means of several delicate tests, it was found that tnere was a slight amount of leakage between the concentric sleeves, the cylinder wall and the piston. Having thus located the trouble, it was a simple matter to remedy it, although just what method was adopted, the Stearns company refuses to divulge. It is easy to surmise how such leakage could be prevented, however. Clearances might be altered, compression rings changed, or any one of several other means for preventing leakage might be resorted to.

The Stearns concern, before adopting the motor, also worked out a change in the oiling system. The movable troughs into which the ends of the connecting-rods dip were retained as Mr. Knight had designed them, but in addition an auxiliary oiling device connected to the throttle adopted. This device consists of a small oil tank located on the back of the dash, under the hood. When the motor has reached an excessively high speed or the load has become very heavy, this auxiliary lubricator comes into play, feeding through the intake ports. In the early sleeve valve motor, a sort of auxiliary oiler, feeding through the cylinder heads, was used. This, however, gave more or less trouble and had a tendency to smoke. It is claimed for the Stearns system that it entirely eliminates this trouble.

Other changes were made by the Stearns concern, of which only the most meager sort of information is obtainable. The so-called junk-ring or cylinder head ring R, Fig. 2, was redesigned, making it heavier and wider, the system of forcing oil to the crankshaft bearings was changed, the construction of the oil gauge, shown in Fig. 3, was altered, the water manifolding was changed, and so on.

With the construction of the Stearns-Knight motor readers of THE AUTOMOBILE are no doubt familiar, the principle of operation and details of this motor having been exhaustively treated in the technical press within the past year. However, for the benefit of those who are not familiar with the motor, the general features of the Knight construction will be reviewed. The sectional cuts and illustrations herewith will serve to bring out the constructional details clearly. Fig. 2 shows the end section of the motor. There are two concentric sleeves, S and S1, which fit within the cylinder, between it and the piston, P. These sleeves move up and down, being actuated by the small connecting links L and L1, which are connected to the eccentric shaft, ES. In the upper ends of these sleeves S and S1 there are slots cut, which serve as port openings, admitting or exhausting the gas at the proper time. When the exhaust or inlet openings in the two concentric sleeves register with one another

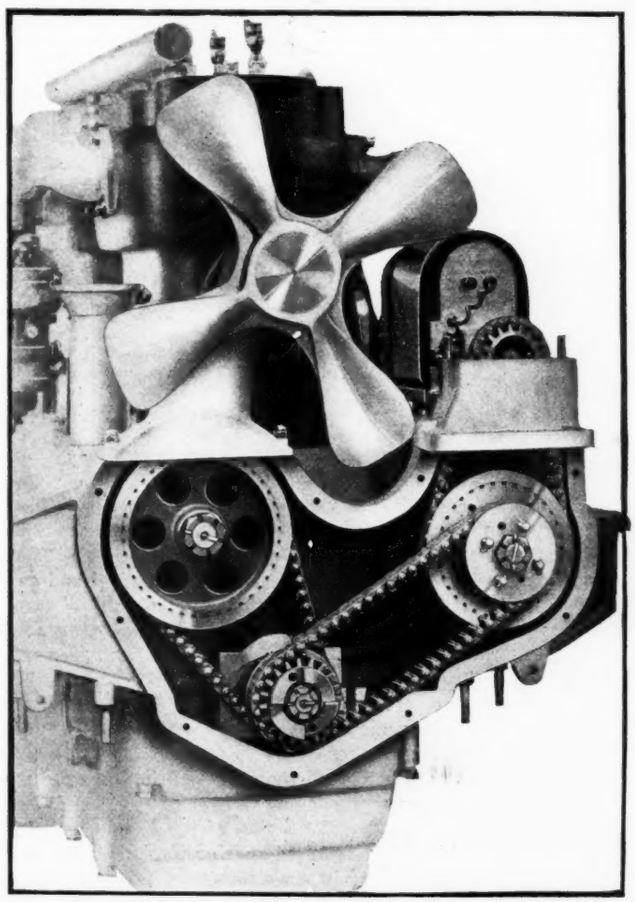


Fig. 5—Front view of Stearns-Knight motor with front plate of timing gear case removed, showing silent chain drive

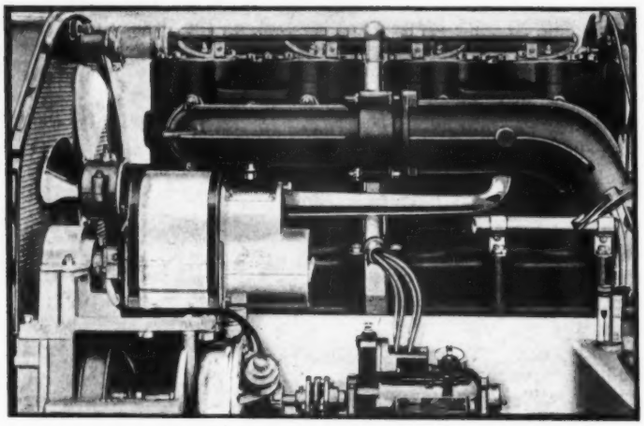


Fig. 6—Left side of the motor, showing the arrangement of Mea magneto and Deaco lighting generator

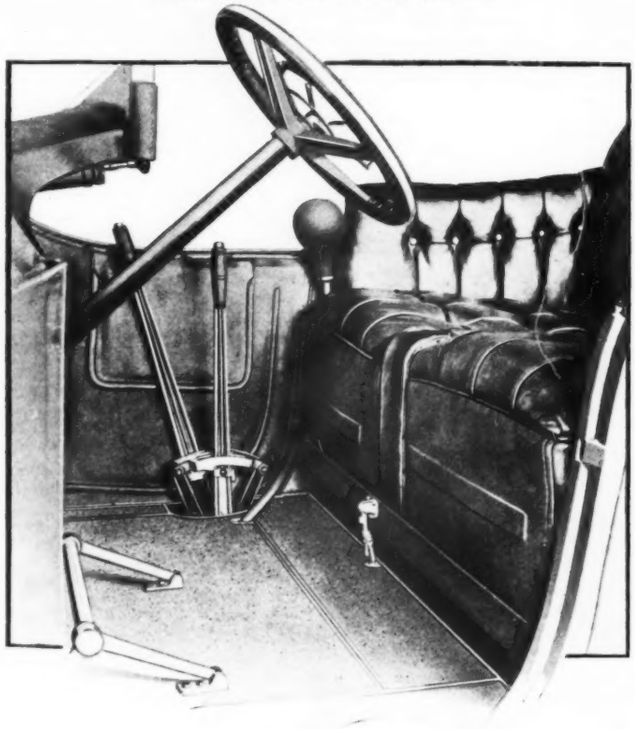


Fig. 7—Driver's seat and control mechanism of 1913 Stearns-Knight, showing provision for operator's comfort

and with the opening in the cylinder wall, there is a path from within the cylinder into the exhaust or inlet manifold, as the case may be. Of course, as soon as the three openings begin to register, there is a partial passage between manifold and cylinder, but the port is not fully open to the gases until all three openings—the two sleeve slots and the cylinder passage—are in exact register. In its motion up or down, the opening or slot in one of the sleeves may be opposite the cylinder opening, but no gas can escape or enter because the passage is barred by the other sleeves. The movement of the sleeves is so timed that only during the exhaust stroke or the suction stroke do the two sleeve ports come together, at the same time being opposite the opening in the cylinder wall.

It will readily be seen that the timing of the Knight motor is a difficult proposition, and required much experimentation and testing during the period of its development.

The movement of the sleeves up and down is very much less than that of the piston, hence the problem of oiling is not a troublesome one. In fact, the stroke of the sleeves is only about

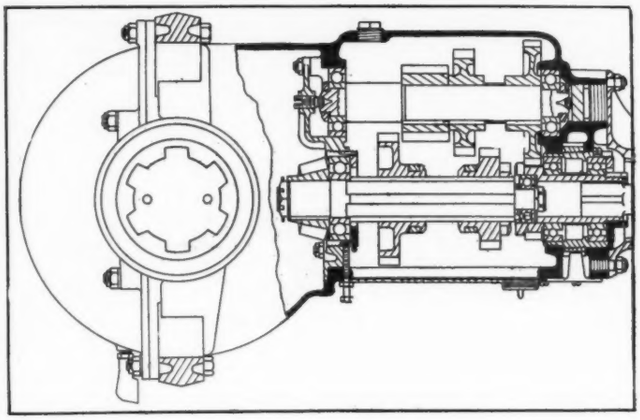


Fig. 8—Sectional view of rear unit of Stearns car, in which the drive is taken directly from the gearbox to the differential

one-tenth that of the piston. That is, while the piston stroke is 5.5 inches, the stroke of either sleeve is only 1.125 inch. For a crankshaft speed of 1,500 revolutions, which means a piston speed of 1,375 feet per minute for a 5.5-inch stroke, the sleeve speed is approximately 140.5 feet per minute, nearly a tenth, as already stated.

The slots in the upper ends of the sleeves are not the same width for both intake and exhaust sides. The lengths are the same, but the width of the exhaust opening is slightly wider, as seen from the following:

	Port length	Port width
Inlet	124 degrees (4.5 inches)	.5 inch
Exhaust	124 degrees (4.5 inches)	.625 inch

The exhaust is made slightly larger than the intake to allow for the complete escape of the exhaust gases and the thorough scavenging of the cylinders.

Silent Chain Drive Throughout

The conventional type of poppet valve motor has its camshafts driven by helical or spur gears, connected with the crankshaft. The Knight motor does not use gears to drive its eccentric shaft, which imparts the sliding motion to the sleeves through the small connecting-rods. This shaft is driven by silent chains, as shown in the illustration. A silent chain also connects the crankshaft with the magneto shaft. The latter in turn drives the electric generator shaft through another silent chain. A diagram of the chain drive and sprockets is given in Fig. 3. The distances between centers of the various sprockets are also noted. They are as follows:

Eccentric to crankshaft	6.87 inches.
Crankshaft to magneto shaft	9.576 inches.
Magneto shaft to generator shaft	7.035 inches.

Each of the three chains has a different width. The chain dimensions are given:

	Width	Thickness	Length
To eccentric shaft	1 inch	.5 inch	29 inches
To magneto shaft	.75 inch	.5 inch	29 inches
To generator shaft	.5 inch	.5 inch	27 inches

The sprockets have diameters as below:

Eccentric shaft	6.424	inches, pitch diameter.
Crankshaft sprocket for eccentric shaft drive	3.222	inches, pitch diameter.
Crankshaft sprocket for magneto shaft drive	3.222	inches, pitch diameter.
Magneto shaft sprocket	3.222	inches, pitch diameter.
Generator drive sprocket on magneto shaft	5.462	inches, pitch diameter.
Generator shaft sprocket	1.406	inches, pitch diameter.

The oiling system of the Stearns-Knight has been briefly touched upon, but special attention should be drawn to the varying-lever oil troughs, T, Fig. 2, one of which is under each of the connecting-rod ends. The scoops M on these rod ends dip into the oil contained in the troughs T and splash it onto the sleeves, bearings, etc. The troughs are connected to the throttle. Opening the throttle raises them so that they will hold more oil, thus feeding more to the bearings, while closing the throttle lowers the troughs so that less oil is available for the connecting-rod ends. A gear pump furnishes oil to the troughs by means of oil leads. Another oil lead goes to the fan, while a fifth passes

to the dash sight-feed. The additional lubrication of the sleeves has already been taken up. It will be noticed that they are grooved to aid in the even distribution of the oil over their entire bearing surfaces. The Stearns-Knight utilizes essentially the same oiling system as that of the Daimler-Knight motor of England.

Fig. 6 shows the left side of the motor. The Mea magneto is mounted below the generator, as seen. The generator furnishes current for all lamps, but not for starting. The American Ever-Ready spring starter is used, and is placed at the front of the motor. It consists of a coiled spring of sufficient strength to turn the crankshaft a number of times when released. After the engine is running, the spring is re-wound automatically. The generator is a Vesta and a Stromberg type of carbureter is used. The gasoline tank is carried at the rear and fuel is fed to the carbureter at 2 pounds pressure.

The eccentric shaft and the crankshaft have five main bearings, each as follows:

Eccentric shaft bearings	Diameter, inches	Length, inches
Rear	1.001	2.625
Center	1.250	3
Two intermediate	1.250	2
Front	1.250	2.5625
Overall length of eccentric shaft		32.125

Crankshaft bearings	Diameter, inches	Length, inches
Rear	2.5	5.25
Center	2.5	3
Two intermediate	2.5	2
Front	2.5	2.5625
Overall length of crankshaft		40.2375

The connecting-rod bearings on the eccentric shaft have a length of 1.6875 inch and a diameter of 1 inch. The piston connecting-rod bearings have dimensions of 2.25 by 2.5 inches diameter and length, respectively. The sleeves, cylinder walls and jacket walls all have a thickness of 5-32 inch.

Details of Transmission Set

Passing from the motor to the transmission and rear construction: The gearbox is at the rear axle, bolting to the differential housing, Fig. 9. The clutch is of multiple-disk type, having fabric facings on the plates where they engage with one another. The clutch is located within the flywheel. From this point the power is transmitted through a universal joint, and thence to the propeller shaft, which is inclosed within a substantial torque tube. This latter is hinged in the conventional way at either side of the shaft to a cross-member of the frame by means of two arms, which form a U-shaped construction. At its rear end the torsion tube bolts directly to the gearset housing.

Radius rods run diagonally from the center of the intermediate cross-frame member to either end of the live rear axle, maintaining the correct alignment of the latter. The gearset provides three speeds forward and reverse. It is of the selective type, gear-shifting being effected through the use of an H-gate. Three-quarter elliptic springs are used in the rear, being shackled outside the frame. The front springs are of the half-elliptic class, and sufficient for the requirements, due to the weight distribution of the car over the front and rear axles respectively. The construction of the suspension on this year's Knight cars is such that easy riding is one of the special claims for the product.

The frame is dropped at about the middle, and raised at the rear so as to clear the rear axle. Brakes are internal expanding, two for each drum. One drum is placed within the other concentrically, the same type of cam-operated expanding shoes being used for both.

The standard form of right drive and right control have been retained, despite the rumors to the effect that the Stearns concern had shifted to the left drive on its new fours. It is not known as yet as to whether the drive and control of the new six will be right or left.

A slight change has been made in the steering mechanism, the steering gearcase now extending from below the frame to the floor boards, giving greater rigidity of the entire steering column. Another minor change which is worthy of note is the placing of all wiring for the electric lighting system on the body. This wiring was formerly run along the frame, but it has been removed from the chassis so as to eliminate any danger of short-circuiting, regardless of how slight that possibility is when the wires are properly inclosed in substantial conduits.

It is in the bodies that the greatest Stearns changes have been made. The appearance of the car, even though it is mechanically nearly a counterpart of its predecessor, is different. The straight-line, flush-side body is now used, the door hinges being concealed. The running-boards have been cleared of tool boxes, battery boxes, tires, etc. Upholstery has been made deeper than last year, and the equipment is more complete. The most important items which come under the latter head are the self-starter, silk mohair top, windshield, Warner speedometer, Klaxon horn, electric generator for lighting all lamps, demountable rims, etc. In fact, it is the intention of the company to adhere to the policy which the leading manufacturers have decided upon for the coming year, and make 1913 its equipment year. The metal fittings, lamps, etc., on all cars are finished in nickel plate and black enamel.

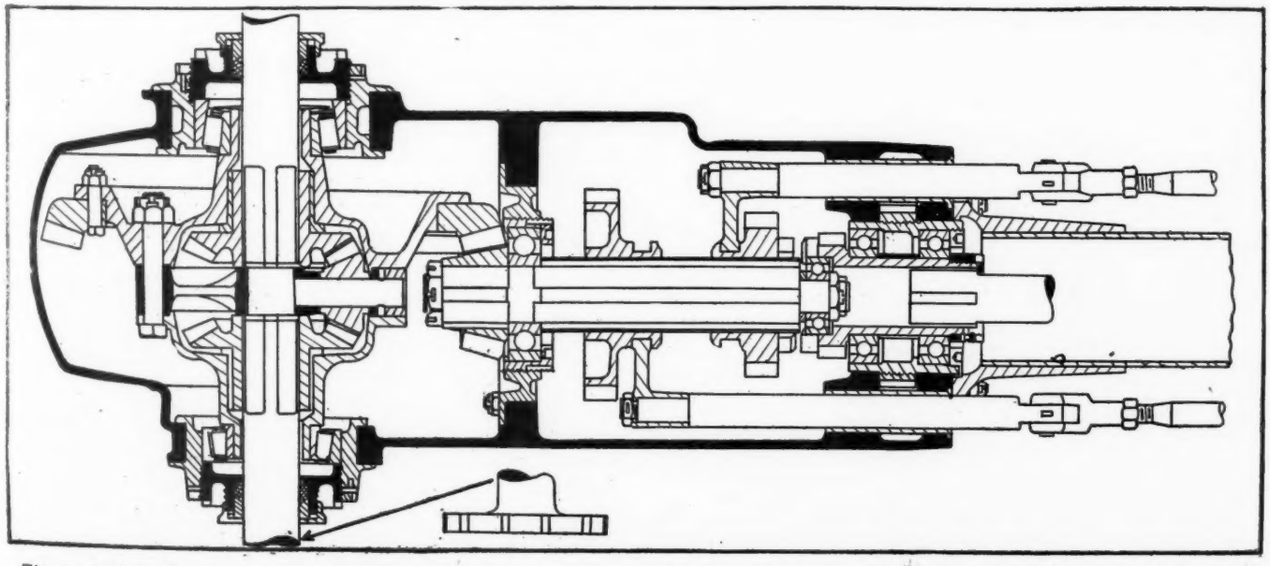


Fig. 9—Section of transmission and differential unit, illustrating the use of torsion tubes and the application of ball bearings throughout the construction

The Automobile

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Reducing the Weight

AMERICAN makers are retrograding somewhat in the present increase in weight in many of the newer models as compared with older models with practically the same motor sizes. Two years ago the weight-reduction argument was more general than it is to-day. At that time several makers went too far in the reduction rôle, producing cars not adequately robust for heavy road surface, but to-day they are steering in the opposite direction.

There have been many reasons for weight additions within the last year and chiefly on several of the 1913 models. The extra equipment is responsible for many additional pounds. The matter of demountable rims alone in this connection is considerable. On some large cars, by actual weight, the tire inflated on the rim weighs exactly 110 pounds. The owner is not content with five rims, that is one spare for the running board, but carries two extras so that his demountable rim and tire weight is alone 660 pounds. Of this 440 is unsprung weight, the two extras carried on the running board being supported through the springs.

But the causes of extra weight go still further: The starter battery and starter mechanism have added weight, yet it is commendable to see that concerns marketing electric starting apparatus are aiming at reducing the weight as much as possible, some claiming to build a satisfactory device not weighing more than 24 pounds and others announcing that their aim is to still reduce this figure. It is certain that at present the weight question is going to be a factor in determining the exact nature of the electric starting and lighting equipment on certain makes of cars. While weight reduction is commendable when adequate strength is maintained it is to be hoped that efficiency will not be sacrificed for weight reduction.

Foreign makers are devoting much attention on their 1913 models on the reduction of unsprung weight, that is weight carried direct on the road wheels and not supported through the springs. They recognize that unsprung weight is not desirable in any way, shape or form. They recognize that unsprung weight reduces the flexibility of the car on the road; they recognize that unsprung weight means greater tire wear; and they recognize that unsprung weight is harder on those unsprung parts, which, because of the duty they play in the car, cannot be mounted otherwise.

Many means are being used in both pleasure and commercial cars to cut down this unsprung weight: A favorite one is the development of forgings in axle construction and the elimination of steel and malleable iron castings. Engineers are expending much energy on this work. The forging art is being developed to utilize the requisite amount of material, placing it in that part where greatest strength is essential and cutting out those parts where heretofore it has not been necessary. There still remains much room for improvement. Not only has bulk been cut away where not necessary but there has been a perceptible improvement in the quality of material used in the forging and more means made use of for testing more generally these parts before placing them in the machine. Then, too, the laboratory has been busy in going further into the details of heating processes, so that in a word the forging art has been carried to the fifth decimal place.

There is a tendency abroad to follow the DeDion plan of getting away from unsprung weight by the forged stationary rear axle and supporting the differential on the chassis frame, thereby carrying it through the springs. In this way the rear axle weight is cut to the minimum, without any reduction in efficiency. Still further in rear axle design is the use of the higher-grade stampings or pressings for axle housings. These stampings are now being made from alloy steels and the processes are so refined that robust housings for high-powered are being produced which weigh less than 70 pounds.

The use of wire wheels, which is in the eye of the American builder to-day, is growing by leaps and bounds in Continental Europe. A few years ago England was the only exploitation ground and because John Bull brought it out France and Germany would have none of it. Two years ago France took it up and now one of the best engineering houses in France has announced that for 1913 detachable wire wheels will be stock equipment. This company has further announced an average temperature reduction of 33 per cent. in tires on wire wheels, due to the rapid radiation of heat from the tire through the metal wheel rim and its spokes. Added to this is the reduction in rim weight on the wheel and the consequent adding of flexibility to the car when on the road. Here also comes longer wear on tires and brake linings.

Full Equipment Now a Necessity With Car Makers

Nowadays An Automobile Is Judged by Its Equipment Which Also Aids or Hinders The Salesman, C. S. Jameson, of the Willys-Overland Company, Tells Sales Managers' Convention of the Automobile Board of Trade

THE subject of automobile equipment would have admitted of more argument several years ago than it can possibly do today. Custom and demand have settled any question, and beyond any doubt. **Full equipment must be furnished by the manufacturer.**

When the automobile was in its infancy, naturally cars were not equal to those of today in any respect, and the prospective customer had not become motor-wise as he has at this time. Now full equipment is expected and demanded, and why not? Certainly, the prospective purchaser has learned, either by experience or through a friend, that equipment is a necessity, and that he pays whether it be on the car when he buys it or at an additional cost. He further appreciates that if equipment is supplied at the factory, and by the manufacturer, it will mean better material, better workmanship, more effective devices and a more harmonious whole.

He knows that the maker of a car cannot afford to jeopardize his reputation by supplying ineffective devices or material of questionable quality; hence, the fully equipped product has the advantage to start with.

The purchaser of a car at $1,000 should not look for the more expensive equipment, and that which would be out of proportion in comparison with cost or selling price. Still, the evidence is strong that, regardless of what the prospective purchaser may be able to pay, he looks not only for such equipment—which might be termed a necessity—but also for that which represents labor-saving devices and comfort.

Manufacturers of medium—and in many cases lower—priced automobiles have shown a willingness to furnish full equipment, and the builders of the higher-priced cars have, from necessity, been obliged to follow suit.

The greater margin of profit on the latter has permitted of more complete equipment, and occasionally extravagance is shown. The future will see even more attention given to the subject of equipment, which will represent a logical and common-sense reason for the difference in price.

A certain percentage of buyers, at least, will pay high prices for equipment de luxe, as they will pay high prices for luxurious hotel, steamboat, train and other accommodations. However, most buyers are looking for their money's worth, and a wide-awake builder of automobiles will, by ingenuity or through the result of volume production, obtain the desired result, and at the same time keep within his class as to cost and selling price.

It must be conceded that the cost of equipment will be reduced as the demand increases, product becomes larger, and use more general. As the selling price of the automobile advances, the demand is more limited and the purchaser more exacting.

The medium-priced product has reached the stage where full equipment today is required, and the car selling at present for $2,500, or above, must be fully equipped. The manufacturer who fails to realize this should not wonder why his dealers lack enthusiasm, and sales drop off.

The purchaser of an automobile is a progressive, and demands up-to-the-minute ideas that add to his protection and comfort. He must be shielded from the inclemency of the weather. He must be permitted to ride on and on without worry and inconvenience.

The automobile without a top may be compared to a house without a roof. The individual who travels in his residence from one floor to another by simply stepping into an elevator and pressing a button will not accept an old style of equipment, nor the lack of it which requires the cranking of an automobile engine on a hot morning in summer, or a cold one in winter.

The man who has electric lights in his home from cellar to attic will not be subjected to the use of kerosene lamps, with their dirt, oil and smut, and this same party will insist on knowing how far and how fast he is traveling, whether it be by automobile or train.

The demountable rim helps to remove one of the great drawbacks to motoring. It is becoming more and more in demand each minute; **but it remains for some fertile brain to give us an acceptable substitute for the pneumatic tire, something with which the words puncture and blow-out have no connection.** He who can do this will surpass Edison in fame and Rockefeller in wealth.

One of the strongest arguments in favor of full equipment by the manufacturer is presented in the cheaply constructed top, top boot, and similar accessories made to sell to the dealer, or purchaser, of the unequipped car at a price. The question of quality never enters into equipment of this nature; neither does the matter of finish, design nor conformation to the lines of the car receive any consideration. **A car of quality may become a subject of criticism and a discredit to its maker through the ill-fitting, poorly proportioned and cheaply made top and top boot.**

In some instances dealers have purchased tops other than that of the car manufacturers' make, and of inferior design and material, and these have been sold to the customer as the factory article, unquestionably injuring the manufacturer's reputation.

The lack of full equipment has been said to encourage price-cutting. The customer realizes the necessity of equipment, and the lack of it appeals to him as an arbitrary and unreasonable position on the part of the manufacturer. A haggling over cost follows, and oftentimes results in the dealer throwing in the equipment at a loss to himself, and such action represents a cut in price.

The fully equipped car unquestionably gives the salesman advantage over competition in many respects, and without considering extremes or fads, the more equipment the greater the advantage.

Place the salesman in a position where he can utilize his time, his knowledge and his enthusiasm in extolling the merits and construction of the car he sells, and not in making excuses because the manufacturer fails to include a boot with a top, or his fossilized ideas led him to think a self-starter was unnecessary and only a fad, or that the demountable rim rusted, or was no better than the old clincher.

It is said that a man is judged by the company he keeps, the company by the men it employs, and I say an automobile is judged by its equipment.

U. S. Motor Assets and Liabilities

(*Continued from page 877.*)

Aggregate Assets of Companies in Receivership

REAL ESTATE, BUILDINGS AND EQUIPMENT—as per the Books	$7,858,266.23	
Deduction—Depreciation as per the Books	1,473,493.24	
	$6,384,772.99	
Value as a going concern—Appraised by Gunn, Richards & Company	$4,999,836.31	
(Auction Value—Appraised by Gunn, Richards & Company, $2,602,000.00.)		
REAL ESTATE INVESTMENTS:—		
Columbus Circle Realty Company—Capital Stock at par—as per the Books	$112,000.00	
Improvements made on premises owned by Columbus Circle Realty Company—per Books	116,311.67	
	$228,311.67	
Building and Improvements appraised by Gunn, Richards & Company at $587,737.00; Estimated Value in the equity based on appraisal	$83,520.00	
New Castle Construction Company—Bonds at par—as per the Books; and Estimated Value, based on appraisal of property by Gunn, Richards & Company	36,000.00	
	119,520.00	
Total Real Estate, Buildings, Machinery and Equipment		$5,119,356.31
FURNITURE AND FIXTURES:—		
Estimated Values, as per Office Employees; Appraiser's Figures not yet received:		
New York Office	$36,000.00	
Factories	40,000.00	
		76,000.00
INVENTORIES—ESTIMATED:—		
At Factories, and on Consignment from Factories, as per actual Inventory July 31, 1912, brought to September 11, 1912, by adding purchases and labor and deducting Sales—as per Books	$5,772,870.52	
Deduction—Reserve for Obsolete Material, etc., estimated by Comptroller of the Company	1,024,831.72	
	$4,748,038.80	
(Of this sum less than $275,000.00 is represented by completed new cars)		
Estimated Value: by Messrs. Anthony, Maxwell, and Jameson (for the Company) on the basis of a going concern for all Factories, all operating, except the "Brush"		4,500,000.00
On the basis of closing down the Brush and Alden-Sampson Factories, $4,100,000.00.		
On the basis of closing down the Brush, Alden-Sampson, Columbia and Dayton Factories, $3,000,000.00.		
ACCOUNTS RECEIVABLE—Not including Inter-Company Accounts—as per Books	$661,257.22	
Deduction—Reserve for Doubtful Accounts—as per Books	73,010.70	
	$588,246.52	
Estimated Value		550,000.00
NOTES RECEIVABLE—In hands of Treasurer—as per the Books	55,406.44	
Estimated Value		34,830.20
CASH IN HAND AND ON DEPOSIT		412,027.80
CASH—Special to provide for Dealers' Deposits (This fund stands to Credit of U. S. Motor Company in Banks as "Special Fund")		62,513.24
PREPAID EXPENSES: Insurance Premiums—Unexpired Proportion—Estimated Value		45,440.21
Total Assets other than Inter-Company Accounts		$10,800,167.76
INTER-COMPANY ACCOUNTS:		
Accounts Receivable—Due from Factories to U. S. Motor Co. and other Inter-Company Accounts—all in Receivership	$4,789,713.56	
Offset by Liabilities in Companies in Receivership—of Equal Amount	4,789,713.56	— 0 —
Accounts Receivable—Due by Branch Selling Companies on Notes Assigned to Banks with Endorsement	$1,303,838.25	
Unassigned Notes and open account	2,066,844.03	
	$3,370,682.28	
Estimated Value of the Entire Debt, Assigned and Unassigned, $1,954,995.72.		
Estimated Value of the Entire Debt so far as Unassigned		1,198,769.54
Notes Receivable—E. R. Thomas Motor Car Company	$5,000.00	
Estimated Value, problematical		2,000.00
Accounts Receivable—National Motors Company—Estimated Value Par		4,042.23
Accounts Receivable—Providence Engineering Works—as per the Books—Disputed	$180,923.53	
Estimated Value		— 0 —
Total Assets, other than Securities Owned: Going Concern Value		$12,004,979.53
SECURITIES OWNED IN OTHER CONTROLLED COMPANIES:		
Briscoe Manufacturing Company—Par Value of Capital Stock Owned	$310,000.00	
Estimated Value, over and above amounts due from U. S. Motor Co.		367,995.00
Appraisal of Real Estate, Buildings, Machinery, etc., by Gunn, Richards & Co., as a going concern $166,995.00, and Auction Value $121,000.00.		
Providence Engineering Works—Par Value of Capital Stock Owned	$500,000.00	
Estimated Value, problematical		1.00
Appraisal of Real Estate and Buildings by S. A. Nightingale & Company, not including Machinery, to the amount of $91,021.00.		
E. R. Thomas Motor Car Company—Par Value of Capital Stock Owned	$2,400,000.00	
Estimated Value		— 0 —
Courier Car Company—Par Value of Capital Stock Owned	$500.00	
This Company has no Assets—Estimated Value		— 0 —
National Motors Company—Par Value of Capital Stock Owned	$849,600.00	
Estimated Value—Based on Equity in Real Estate at Boston (Mass.); New Castle (Ind.); Equity in certain Branch Selling Companies; Cash; Receivables, etc.		355,190.07
TOTAL ASSETS, ESTIMATED VALUE		$12,728,165.60

Aggregate Liabilities

REAL ESTATE MORTGAGES		$164,540.90
DEBENTURE BONDS, BOND SCRIP AND INTEREST		6,161,509.87
NOTES OF ONE OR MORE OF THE SUBSIDIARY COMPANIES:—		
Endorsed by the United States Motor Company, and Notes of one or more of the Branch Selling Companies endorsed by the United States Motor Company, with interest		*2,194,258.12
NOTES OF UNITED STATES MOTOR COMPANY:—		
Endorsed by one or more of the Subsidiary Companies		650,820.99
CLAIMS AGAINST UNITED STATES MOTOR COMPANY ONLY:—		
Of this sum, approximately $100,000 is due for goods delivered immediately prior to Receivership		1,961,875.99
CLAIM AGAINST COLUMBIA MOTOR CAR COMPANY, OR UNITED STATES MOTOR COMPANY OR BOTH		91,789.60
NOTES SECURED BY SIGHT DRAFT ON CAR SHIPMENTS		63,691.26
WAGES OF EMPLOYEES AND ACCRUED EXPENSES		74,256.30
DEALERS' DEPOSITS (PARTLY OFFSET BY ACCOUNTS RECEIVABLE)		55,113.24
CONTINGENT LIABILITY ON ENDORSEMENT OF NOTES OF E. R. THOMAS MOTOR CAR COMPANY		†400,000.00
PROVIDENCE ENGINEERING WORKS:—		
Claim made for work performed—Disputed	$138,532.26	— 0 —
TOTAL LIABILITIES OTHER THAN INTER-COMPANY		$11,817,856.27
INTER-COMPANY ACCOUNTS:—		
Briscoe Manufacturing Company	$313,970.91	
The Capital Stock of this Company is owned entirely by the United States Motor Company, and, as the Briscoe Manufacturing Company is regarded as a solvent Company, this liability is taken at		— 0 —
EXCESS ASSETS—Estimated Value as shown—Over Liabilities as Shown		910,309.33

*It is estimated that the Branch Selling Houses can pay $756,226.18 on their Notes, after providing for their local indebtedness.

†The Receivers of the E. R. Thomas Motor Car Company estimate that that Company will pay from 25% to 40% to its Creditors.

CAPITAL STOCK (NOT INCLUDED IN THIS STATEMENT) OUTSTANDING—OUTSIDE OWNERSHIP:—		
United States Motor Company, Preferred	$11,499,733.33	
United States Motor Company, Common	12,206,350.00	
Columbia Motor Car Company, Preferred	13,400.00	
Columbia Motor Car Company, Common	118,000.00	
	$23,837,483.33	
TOTAL		$12,728,165.60

Russell Profits Show Increase

TORONTO, Oct. 28—Profits of $180,127 for the year ending July 31 are shown in the annual statement of the Russell Motor Car Company which will be presented at the annual meeting of shareholders October 31. This is an increase of $2,598 over the previous year and is not so large an increase as was expected. After paying dividends on common and preferred stock and deducting underwriting and other expenses connected with the issue of additional preferred stock, a profit and loss balance of $303,133 is carried forward. This compares with $246,068 carried forward last year.

Dixon Company Promotes Long

JERSEY CITY, Oct. 28—At the regular monthly meeting of the board of directors of the Joseph Dixon Crucible Company the following changes in the officers and board of directors were made on account of the death of Vice-president William H. Corbin:

George E. Long, former treasurer, was elected vice-president to succeed Mr. Corbin; J. H. Schermerhorn, former assistant secretary and assistant treasurer, was elected to membership in the board of directors and treasurer of the company; Albert Norris was elected to the office of assistant secretary.

England and Low-Priced American Cars

THE British market only began to feel the importation of the American cheap car about the time of the annual Olympia show, November, 1911, when there was an extraordinary scramble of dealers desirous of taking up agencies for the cheap American car. It was then felt that the British public was at last beginning to feel confidence in low-priced American goods, as previously there had been a good deal of scepticism among the general public with regard to American-made articles, principally caused by the impression left of American bicycles and boots.

Engineers, of course, have long been aware of the excellence of the American machine tools, but the automobile at $1,000 or less was an entirely new proposition,

The Britisher is naturally slow to take up a new thing, particularly such as this, where solidity of construction does not exist, and appearance is so diverse from that which has been his custom.

We will now consider a few figures showing the development of the business in the importation to Great Britain of American automobiles.

AUTOMOBILES AND PARTS IMPORTED FROM AMERICA INTO ENGLAND

Year	Cars	Value	Value of Parts
1907	555	$879,135	$135,410
1908	348	481,455	91,665
1909	427	607,100	124,000
1910	1,101	1,076,485	427,035
1911	3,734	2,961,320	1,332,890
1912 (6 months)	3,327	2,792,935	.....

It will thus be seen that the total number of cars imported during the first 6 months of 1912 was nearly as many as the total importation during the whole of 1911, and the average value of these cars is about $1,000.

It is about 10 years since the small American cars first made their appearance in England, and at that time the American industry was quite in its infancy, and the cars produced compared in design and construction very unfavorably with the European article. Even then, however, the type and price of the goods were unique in their way, and were not in competition with anything European.

These two marks have ceased to exist as far as Britain is concerned. The cheap American car has entered a field hitherto untouched and unapproachable on account of the price question, and has shown that the large British middle class exemplified in the man of moderate means is the buyer of an automobile at a price. However, this does not exist to so great an extent in Britain as in America, as the cost of running a car in the former country is much greater than in the latter, and the facilities for storing are very inferior and generally expensive.

The tendency has been in England particularly toward the development of a small bore and very efficient engine, and this is due to the high rates of taxation. Such an engine is expensive to construct and it cannot compete in price with the less efficient American engine. Furthermore, the high finish which is usually demanded in Europe cannot be given at a low price.

The American car has taught the buyer to be satisfied with an automobile that will run with very little attention and at the same time will be reliable, and if he does not pay the price of a highly finished car he must be satisfied with utility, which, by the way, is the first consideration.

It has been rumored from time to time, that renewed efforts are being made by those American concerns having a very large output, to land their surplus production on the open British market at prices showing the minimum margin of profit. Such a dumping of goods is apparently a satisfactory state of affairs to the so-called free-trader, but the far-thinking Britisher sees English capital going abroad which could well be spent at home, giving increasel employment to the work people of his country.

The keen American business man is fully alive to the political state of Britain, and is raking in the dollars while he has this glorious opportunity of so doing. The foothold he is now gaining he will not be prepared to lose without a struggle, and whatever may be done by the Britisher in the way of a large local production of cheap cars will undoubtedly be met by retaliation from the other side.

Unfortunately, there is a class of British manufacturer aptly termed the Dog-in-the-Garage, who does not see further than the length of his nose, and he takes up the attitude that as his factory is full of work, and that he and his stockholders are making a comfortable income, everything is well.

He fails to realize that the progressive business man is never satisfied with things as they are at present, and that if his factory is full and prospects are good, it is policy to increase the size of that factory, and his output at the same time. By so doing each article he makes can be more cheaply produced on account of quantity production, his employment of labor increases, and his actions tend toward the prosperity of his country as a whole.

While considering this question of production there is one important point which must be borne in mind; namely, the labor question. In America, a machinist can earn practically what he likes unhampered by the unions, and a man is paid more or less on results.

In Britain, however, very strong trades unions exist whose policy is to limit output, and to keep up the wages of the inefficient. Under such circumstances large productions can only be carried out by means of a very strong policy, and in order to avoid any serious difficulty arising on this score, the writer has obtained quotations from large American manufacturers of standardized parts, to supply their goods to a British concern assembling the same on British soil.

The $2,000 car and upwards of American make cannot, at the present time, obtain any substantial footing in the British market, as that is a type of car upon which British manufacturers have specialized and can produce at very good value for the money. It may be, however, that the importation of the cheap car is merely the thin end of the wedge, and among some British authorities this is considered to be the case. The effect, however, on the British market is that the manufacturers of the $2,000 type of car are being hampered in their sales by reason of the decreasing demand for used cars. This is how the situation has arisen: Many owners of automobiles are in the habit of arranging with dealers to take over their used cars in part payment for new ones. The dealers now find that the market for used cars is rapidly falling off, buyers of cars at the old figure of a $2,000 used car have now the alternative of purchasing a completely equipped new American car at the same figure.

There is, therefore, considerable reluctance on the part of the dealers to take these cars into stock generally resulting in the loss of sale of a new car every time. The Dog-in-the-Garage type of manufacturer fails to see this, but the effect is growing rapidly to his and other people's detriment.

The other side of the question is that the low-priced American car has made motoring possible for a large population who would otherwise be unable to afford it, and has incidentally developed a motor feeling and way of thinking that brings into line a large number of people whose interests are allied. These beginners circulate money in the automobile industry and the majority will eventually become purchasers of more expensive cars.—*R. W. A. Brewer*, London, Eng.

It has been discovered that in the city of Philadelphia there are at present on the statute books thirteen separate ordinances governing and defining the rights of various classes of vehicles. The new ordinance now being considered is a composite of all the thirteen. Maximum speed of 10 miles an hour is provided within the city limits under penalty of a $25 fine.

Bronze Flame Welding

Experiments Show That Rapid Heating of the Metal Modifies Its Physical and Mechanical Properties

Conclusion of Tests Is That Autogenous Welding of Copper and Its Principal Alloys Is Practicable

A SERIES of welding tests was carried out recently with bronze, three ordinary types being used and for convenience here designated A, B and C. Their chemical composition was:

	Per Cent. A	B	C
Copper	94.2	87.9	87.1
Tin	5.7	11.01	9.3
Zinc	....	1.53	....
Lead	....	....	3.48

The metal used was in rods 25 millimeters, 1 inch diameter, cast in molds of well-dried earth to insure homogeneity of the alloy. As welding material very thin rods of bronze of exactly same composition were used. When the welding was done, in spite of all precautions innumerable vesicular cavities were formed in the zone of the weld over the entire surface of the weld.

The great heat to which the metal is subjected, and the sudden variations of temperature which occur within it during the process of welding and in the course of the subsequent cooling, each play their part in modifying profoundly the structure of the metal in the zone of welding. High temperatures, facilitating the oxidation of the fused metal by means of the action of the oxygen of the atmosphere, determine, in the first place, the oxidation of those constitutive elements of the alloy which have most affinity for oxygen—as, for instance, tin, zinc, and lead. This oxidation reveals itself in the decreased proportion of those elements which in part are volatilized, and in part pass into the slag in the form of oxides; also in the formation of bubbles or vesicles, arising from the partial reduction of these very oxides by the excess of metal (the metallic mass) present; also in the lowering of the mechanical properties of the zone of welding, caused by the innumerable vacuoles set up within it, and accentuated by the diffusion of tin dioxide (SnO_2) in the mass of the alloy, partly in the shape of acicular inclusions.

Moreover, the high temperature attained in the course of the process of welding, with alloys of low tin content (alloy A), in which really a single constituent is present—α mixed crystals of copper and tin—determines, as we have seen in the case of pure copper, a commencement of ignition of the metal, with the consequent formation of big granules.

Finally, the rapid variations of temperature during the process of welding, determine—in the case of bronzes of higher tin content, wherein two constituents are present, namely, the α and β mixed crystals of copper and tin—an irregular and very conspicuous subdivision of these constituents, imparting to the metal a heterogeneous structure.

The localization of the surface of fracture in the samples of welded copper to the margin of the chamfer is again observed in the case of the zone of welding of bronzes.

Admitting all that precedes, we may reasonably expect that an appropriate reheating of the welded portion will prove even more efficacious than in the case of copper, because, in addition to relieving the internal strains of the metal set up by the process of welding, it tends to restore to it an improved homogeneity of structure.

Brass—A third series of experiments was conducted, by the same methods with the types of brass fusible at high temperatures, here designated respectively as M and N. Their composition is as follows:

	M Per Cent.	N Per Cent.
Copper	60.2	55.18
Zinc	40.08	41.50
Manganese	....	3.2

The first mentioned was cast in rods, measuring 30 millimeters (1.2 inch) in diameter, in dry earth-molds; the other was wire-drawn into rods, 2.5 millimeters (1 inch) in diameter. The welding material consisted of very thin rods, in each case of exactly the same composition as the original alloy.

The phenomenon of the unwelcome vesicles, set up in large numbers within the welding zone, despite all the preventive precautions that could be taken, was intensified in the case of these alloys by the extreme facility with which the zinc contained in the metal oxidizes. In Table 3 are set forth the results obtained from shock tests and from chemical analysis of the various samples.

Microscopic examination, confirming the results here tabulated, leads to the same conclusions as those postulated in regard to the bronzes. In order, therefore, to avoid needless repetition, I will content myself with referring the reader to what has already been said on that point. We may note, however, in these alloys a diminution in the capacity, when heated, of absorbing the products of combustion of the welding flame; coincidently with this

TABLE III.—SHOCK TESTS WITH THE CHARPY APPARATUS*

No. of Sample	Thermal Treatment	Indicated Angle	Breaking Test Kgs. Mm.	Mean Chemical Analysis		Remarks
				Of the Metal. Per cent.	Of the Weld Zone. Per cent.	
M1	Reheated	128°	4.646	Cu = 60.2 Zn = 40.08	.....	Not welded.
M2	Cooled in air after welding.	141°	2.112	.....	Cu = 69.3	Welded; finely granular fracture; numerous vacuoles.
M3	Reheated after welding.	138°	2.646	.....	.....	Welded; finely granular fracture; numerous vacuoles.
N4	Reheated	128°	4.646	Cu = 55.18 Mn = 3.2	.....	Not welded.
N5	Reheated after welding.	140°	2.286	.....	Cu = 68.75 Mn = 1.2	Welded; medium-grained fracture; numerous vacuoles.

*See Table 1, page 885.

Digest of the Leading Foreign Journals

(*Continued from page* 884.)

usual construction is shown in Fig. 9. The loss comes from using the walls of the crucible or the walls of the housing around it as conductor for transmitting heat to the crucible and its contents. The innovation consists in producing the heat in the crucible 4 by bringing only the bottom 5 of the crucible in contact with the die 6 which is made of tungsten-copper, preferably and is highly conductive. The pressure of the die is regulated by the weight of the crucible and the melt and can be increased if necessary by adding the weight of the current-carrier 7. After the smelting the die and the carrier 7 may be raised by means of crank-arm 13 so as to permit the tipping or removal of the crucible. The invention is patented in Germany by Pfretschner & Company.

Filip Tharaldsen, of Norway, has also an improvement looking to economy in electric smelting. Owing to the continued high heat which is sometimes necessary in the reduction of ore, considerable quantities of valuable materials escape in gaseous form. To avoid this loss Tharaldsen builds a system of flues in which the gases are brought in contact with chemical reducing agents, with provisions for cooling, and are returned to liquid or solid state, in which form they fall back into the melt.—From *Metallurgie*, August 8.

diminution, the liability of the welded parts to fracture along the margins of the chamfer decreases.

CONCLUSION—The results obtained and the observations recorded in this triple series of investigations concerning the oxy-acetylene autogenous welding of copper and its chief alloys demonstrate:

1—That rapid heating and sudden fusion of the metal subjected to welding profoundly modify its physical and mechanical properties, developing within it internal strains and structural alterations which are of detrimental effect.

2—That the structural modifications which take place in the process of welding, apart from the alterations in composition of the metal, may be classified under two principal headings: *a* coarse crystallization of a single-constituent metal, and *b* minutely heterogeneous structure of an alloy consisting of two or more elements. We must also take into account the discontinuity of structure attaching to metals in which there are oxide inclusions or vacuoles.

3—That the deficiency in mechanical properties, most conspicuous in all that regards the tenacity and elasticity of a metal, is expressed in the case of copper by an average reduction of 50 per cent. in the capacity to resist fracture, and an increase of about 30 per cent. in brittleness, while the percentage ductility is reduced to about a tenth of the original. In the case of bronzes and brasses, the deficiency in mechanical properties is not susceptible of rigorous mensuration, but it is greatly intensified and proportionately detrimental as the number and variety of the constituents of the alloy subjected to welding are increased.

4—That, while mechanical treatment, such as hammering along the zone of welding, has practically no useful effect on the properties of the welded metal, thermal treatment, such as reheating, prolonged for a suitable interval at a fixed temperature, exerts an undoubted ameliorative influence, since in the first place it relieves the latent internal strain set up by the sudden temperature changes involved in the process of welding, and in the second place it restores homogeneity to the structure of the metal itself. Consequently, and more particularly in the case of alloys made up of several constituents, the conditions of cooling of the welded metal are of special importance, the slower the cooling the greater being the ameliorative effect.

5—That considerable variations—diverse according to the manner in which the process of welding is applied—occur in the composition of bronzes and brasses; these variations are the more extensive the greater is the number of constituents of which the alloy is made up, and also in proportion to the affinity of these constituents for oxygen and to the volatility of the oxides formed therefrom. Thus, for example, in the bronzes of type B (Table 4), in the welded zone, there is an average diminution of 19.0 per cent. in the proportion of tin; while the loss of zinc, a more easily oxidized metal than tin, amounts to 22.3 per cent. (the original proportion present being smaller than that of tin). In brasses, wherein the percentage of zinc is much higher, its decrease in the welded zone amounts to 28.7 per cent. We must also bear in mind that the oxides thus formed have a tendency to diffuse easily into the metal, modifying profoundly its properties. In pure copper subjected to the welding process changes in chemical composition cannot be traced, as the metal is made up of a single constituent; and it is only affected deeply by oxidation when the necessary precautions have been omitted in the process of welding, the suboxide then formed diffusing with great facility into the copper.

6—That taking into account the results obtained and the conclusions here postulated, we may assert that the oxy-acetylene autogenous welding of copper and its principal alloys has a practical application, limited to those parts of machinery which are not of large dimensions and are not subjected to severe mechanical stresses.

Contet's Formula for Countersprings

(*Continued from page* 889.)

ment of the subject, and it is therefore not so remarkable that both arrived at the same astonishing theory with regard to the action of countersprings.

The final formula presents some additional points of interest. Unless the numerical value of d_1 is larger than that of d the total value of D becomes negative, which is absurd and means that the counterspring must be more flexible than the main spring. If these values are equal, then D becomes infinitely greater than d, and the compound spring bends without resistance. These absurdities are obviated in practice by making the counterspring much shorter than the main spring. In this practical form its principal action is to brake the recoil of the main spring, an action which is not considered in the mathematical development of the subject at all.

In our opinion, Mr. Jones clouds the subject by presenting, in his Fig. 6, a type of compound spring which is used nowhere and with regard to which it is difficult to conceive that the counterspring can follow with its oposite tension the main spring throughout its range of deflection.—ED.

TABLE II.—TESTS WITH CHARPY APPARATUS.*

Number of Sample*	Measurements of Sample in Millimetres	Thermal and Mechanical Treatment	Average Ultimate Stress. Kgs. per Square Mm.	Average Elongation. Per Cent.	Average Contracted Diameter in Mm.	Average Hardness. Brinell,† 500 Kgs. Ball 10 Mm. Diameter	Remarks
1	Diameter=15 Useful length=150	Reheated	23.0	43.4	....	0.38	Not welded.
2	Diameter=15 Useful length=150	Cooled in air after welding.	10.5	2.6	....	44.5 in the weld	Welded with pure copper; rupture in the weld; fracture coarsely and irregularly granular; vacuoles (small) present
3	Diameter=15 Useful length=150	Cooled in air after welding.	12.3	3.1	....	43.0 in the weld	Welded with phosphorized copper; rupture in the weld; medium-grained fracture.
4	Diameter=15 Useful length=150	Reheated	11.3	4.8	....	36.0 in the weld	Welded with phosphorized copper; rupture in the weld; medium-grained fracture.
5	Diameter=12 Useful length=100	Not reheated	24.0	40.0	7.3	54.0	Not welded.
6	Diameter=12 Useful length=100	As Sample 2	12.9	2.0	11.8	35.0 in the weld	Welded with pure copper; rupture in the weld; coarsely granular fracture.
7	Diameter=12 Useful length=100	As Sample 4	13.5	4.5	10.3	34.5 in the weld	Welded with pure copper; rupture in the weld; coarsely granular fracture.
8	Diameter=12 Useful length=100	Hammered and reheated after welding.	14.2	3.4	11.2	36.0 in the weld	Welded with pure copper; rupture in the weld; medium-grained fracture.
9	Diameter=12 Useful length=100	Hammered and reheated after welding.	13.1	2.8	11.6	40.0 in the weld	Welded with phosphorized copper; rupture in the weld; medium-grained fracture.

*Two samples, prepared and treated in the same way, correspond to each number.
†The Brinell tests were carried out on samples other than those subjected to the torsional tests.

—Table IV. will appear next week.

Two Moline cars driven by Joe Wicke and Frank Salisbury which finished the Chicago Motor Club's reliability run with perfect scores

Molines and Staver Win Tour Around Lake Michigan

Three Perfect Scores in Reliability Run of the Chicago Motor Club—Ten Cars Finish Out of the Field of Fifteen Starters—Velie Second in Touring Class and Bergdoll Follows Molines

CHICAGO, ILL., Oct. 28—Completing the 1,200-mile trip around Lake Michigan over roads that had been called impassable to automobiles in certain sections, the Moline pair in the roadster division and Staver No. 4, in the touring car class, finished with perfect scores and all three looked as if they could have stood a stringent technical examination, if such had been required by the rules. The Moline pair win the team trophy offered, and the individual prize in their class. The former was offered by the Chicago Motor Club. The class prize is the Morton J. Luce cup and if it is conferred upon one of the cars, a drawing will be necessary.

Ten out of the fifteen cars that started from Chicago, October 21, checked in after the trip as contestants.

The Staver entry captured the W. E. Stahlnaker cup for the best score in the touring division.

Of the touring cars, the Velie No. 1, driven by John Brolley, took second honors. This was the same car and the same driver that carried the pathfinding crew when the route was laid out 6 weeks ago. Staver No. 3, with G. Knudson as driver, finished third, the Case fourth, the Bergdoll No. 5 was fifth and A. M. Robbins' Abbott-Detroit No. 6 was sixth.

In the small car division, the Bergdoll No. 104, with Tom Rooney driving, was second to the two Molines, while Anderson in the Stutz No. 109, was the only other driver in this division to finish. Anderson, although heavily penalized on account of broken springs, wins the amateur driver's trophy, as he was the only driver entered who was not affiliated with the trade.

Overshadowing all the other features of the run was the consistent performance of the Moline team, the staunchness of the two cars and the masterly way in which they were handled by their drivers. It was to the credit of Salisbury and Wicke as much as to the quality of their mounts that the Molines finished without penalty. Few drivers could have put any car in 7 days over the roads which encircle Lake Michigan, without experiencing difficulties of some kind on the road. Other cars in the contest might have done as well had they been handled with the care shown by Salisbury and Wicke but not even the best driver could have put a mechanically weak vehicle over those roads, and at that speed without more or less penalty.

Monckmeier and his Staver are deserving of at least as much credit as the Moline drivers and their mounts, for not only did the little Swede finish his car with a perfect score but, like the Molines, could have withstood a final technical examination, had there been one, with very little loss of credit. Monckmeier's driving can be credited for his win over his team-mate Knudson, for had the latter used the care that Monckmeier did in driving through the heavy mud of northern Wisconsin he would not have been forced to clean out his carbureter, and also would have annexed a perfect score.

The driving rain and heavy mud of the first 3 days of the run were responsible for most of the difficulties encountered by the cars. It rained almost incessantly for 2 days and the clay roads of northern Wisconsin and the northern Peninsula of Michigan became perfect quagmires, necessitating a great deal of low gear work, particularly on the hills, and causing carbureters to become choked up with the mud and water that splashed against them. The rains which had made the first two days run from Chicago to Escanaba a most disagreeable and hazardous trip, probably saved the day for the tourists when they entered the heavy sand in the north woods and pine barrens of the northern peninsula and all around the head of the lake. Sand hills which had been reported as almost impassable by the pathfinder were negotiated with little difficulty because the rain had packed them so that traction was afforded the rear wheels.

The third day's run from Escanaba to Newberry, the northernmost point of the trip, is only 122 miles in length but was expected to be nearly the worst part of the route. The schedule

Velie, driven by John Brolley, second in touring class

was reduced to 13 miles an hour for the touring cars and 11 miles an hour for the roadster division. This speed seemed to be none too low as it took the pathfinder 6 days to cover the distance. The road for the greater part of the way winds through the forests of mixed pine and hardwood and over great stretches of pine barrens and burnt over woods, with stretches of corduroy roads, merely logs laid side by side through the swamp.

For about 10 miles north from Escanaba the road built by the state from Marrinette to Escanaba is extended around the shore of Little Bay de Noc. The fine road came to an end suddenly between the towns of Gladstone and Kipling. After reaching Rapid River the real wilderness was encountered. From here on the road consists of wagon trails winding in and out through the woods with branches extending in all directions and the forest encroaching on the roadway as though begrudging the space it took. These branching trails, however, merely take a labyrinth course among the trees and finally come back into one road further on. The roadbed was alternating patches of sand and muck in which the cars dragged their mud pans. In places there was the corduroy through the morass and in other places the road is made out of bark which provided good going.

Right in the middle of the forest when the tourists had begun to lose hope of there ever being better going, a stretch of fine hard macadam was found, 5 miles in length, which began nowhere, passed through nothing but woods and ended nowhere. At a little trading post called Thompson's, the first sight of Lake Michigan since leaving Milwaukee was obtained. From there on the road is good, and within about 4 miles of Manistique another stretch of the state-built macadam was picked up.

At Manistique the tourist had the first taste of Michigan hospitality and began to realize the interest aroused in road building and motor cars in the north woods. The whole city turned out to welcome the tourists and they were tendered a luncheon at the Elks' Club. The macadam led the tourists northward from Manistique for a few miles and then abandoned them to the same sort of going as they encountered in the morning. Newberry, the night control, was reached shortly after dark. The road traversed for the day, though quite bad in spots, showed that work was being done upon it toward improvement and in fact men and teams were working on the road when the tourists came through. The county engineer of Delta county had gotten busy when the pathfinder went through, and in the 6 weeks intervening had done a great deal to improve the conditions. He had gotten out a route map and had it printed so that each of the drivers could be sure of striking the improved road which deviated somewhat from the route laid out by the pathfinder.

In spite of the condition of the roads only three cars were penalized during the day. Monsen had to refill his radiator three times because the jolting had started it to leaking, on account of the necessity of so much low gear work. Park's R. C. H., No. 7, stripped the gear in the gearset, in the heavy pulling, and did not get into Newberry until long after the tourists had checked out the next day. He was 12 hours late and consequently was automatically withdrawn. Park and his passengers were forced to spend the night in the woods but, although out of the contest, pluckily stayed in the game and by driving night and day caught up with the tour at Petoskey, and finished with the rest. In fact, the R. C. H. had the honor of acting as pacemaker as far as South Bend on the last day of the tour when the referee's car was temporarily out with a broken spring. Anderson's Stutz was forced to take on water twice the third day. At Newberry the tourists were treated to a chicken dinner, followed by a dance, at which the town fathers and county authorities told of their plans for making a motor boulevard through the woods and promised roads that would be good all the year round within 3 years.

Tom Rooney's Bergdoll, which was second to the Molines

From Newberry to St. Ignace, the fourth day's run, is but 65.2 miles in length but promised to be the hardest of all, as there is deep sand along the shores of the lake most of the way. However, less than 5 hours was consumed in making the trip. The only difficulty which was encountered by the cars as a whole was the trouble in following the trails through the sand plains. The whole party was lost completely for three-quarters of an hour and went about 12 miles off the course.

This was the day that spoiled two perfect scores. The Case got 3 points for replacing a magneto wire which had jolted off over the corduroy roads; the Abbott-Detroit dropped out of the perfect score class when it became necessary to refill the radiator. All the radiators had been drained the night before to prevent danger of freezing and the pet cock in the Abbott had been left partially open. In the midst of a vast expanse of brush and

The Staver team, G. Knudson and A. Monckmeier. The latter was the only driver to finish with a perfect score in the touring car division

J. Hanson's Case was one of the cars to finish. His penalties were practically all caused by the roughness of the road traversed by the tourists

second-growth timber the radiator went dry and Robbins' mechanic, Berry, scrambled 2 1-2 miles through the dense underbrush and sand to the lake. After the radiator was filled the party proceeded 100 yards when a turn in the road brought them onto a bridge under which flowed a stream of clear water. This day was Rooney's hoodoo, too, for in making a quick spurt through deep mud around one of the cars which was wallowing painfully through, Rooney ran into a tree and broke his steering knuckle. He walked back 10 miles and secured a repair part, which was put in, and by a wild night drive caught the tourists the next day.

Anderson, as well, had bad luck on the fourth day, as he stripped both low and intermediate gears and had to negotiate all the sand and mud and steep hills on high gear, with a gear ratio of about 2 1-2 to 1. The wild driving necessitated by this caused him a succession of broken springs which cost him over 1,100 points in penalty, and required that he drive all night to get into control before his time limit of 12 hours had elapsed.

Upon arrival of the cars at St. Ignace at about noon they were loaded upon flat cars and these run upon the ferry, which took them across the Straits of Mackinac to Mackinaw City. The trip on the ferry takes about an hour and another hour is consumed in loading and unloading a car. With the sixteen cars entered in the tour the entire afternoon was spent in getting the cars loaded and unloaded at Mackinaw City. It cost $6.50 to ferry a car across the Straits and 50 cents additional for each passenger. The railway authorities on the west side of the Straits are very accommodating and load the cars themselves, but the local officers at Mackinaw City, of the Michigan Central, seemed unwilling to render any assistance whatever and the tourists had to unload the cars without assistance. All the gasoline had to be drained from the fuel tanks before they were shipped across.

The night was spent at Mackinaw City and the start for Traverse City was made next morning at 9 o'clock. Once on the east side of the lake the tourists felt the worst of the trip was over and were inclined to take things easy. The late start enabled several of the cars which had been delayed to rejoin the tour and Rooney, Anderson and Park's R. C. H. took advantage of the opportunity. It was at Mackinaw that the tourists were overtaken by the Staver Dictator, a new 1913 Staver model, that had not been completed in time for the start from Chicago. With three men it left Chicago Tuesday night and caught up with the tourists at Mackinaw, making the 4 days' drive in 2 days. The car was pushed through night and day with one driver sleeping while the other piloted the machine and the third man read the route directions to the driver. The car was stopped only long enough for the men to get supplies of fuel and oil and food, except for 3 hours, during which the men slept on top of the warm boilers of a lumber mill in the north woods. From Mackinaw City to Traverse City was scheduled for the fifth day's trip. The distance was only 109 miles and was the easiest jaunt of the entire trip. The route lies through a beautiful rolling country, over fair roads all the way and fine macadam around Petoskey, the noon control. In the afternoon the route followed the lake closely and ran through a string of summer resorts almost the entire distance to Traverse City. The roads are very good and motor cars abundant. In spite of the easy trip, however, three cars accumulated demerits. The passengers in Hanson's Case had a very narrow escape from serious injury when a rear wheel loosened up and started to come off. By dexterous driving Hanson succeeded in keeping the car right side up and getting it stopped. The repair cost the Case 38 points. Monsen accumulated 52 points more for the Bergdoll who found a leaky radiator and had to clean the mud out of it and solder it up. He was having slight engine trouble as well, and the adjustment of the push rods also helped in his total. Stutz got 57 points more penalty on account of another broken spring.

From Traverse City to Grand Rapids, a distance of 207.3 miles, was the sixth trick, with lunch at Ludington. The route was through Manistee, Ludington, Pentwater, Hart and Muskegon. The roads were worse on this day's run than was expected, as there was a good deal of work being done on the roads and they were closed for miles in several places which necessitated detours through heavy sand, and in other places the newly worked roads made heavy going. The contesting cars had begun to show the wear and tear they had gone through and heavy penalties were acquired by several of them. Brolley's Velie stripped its first speed gear on a hill when stalled by a farm wagon in front of it and the strain of starting on second started the clutch to slipping so that it had to be adjusted. The Bergdoll No. 5 had a leaky radiator and was continually taking on water. One rear wheel loosened up as well and Monsen was assessed 54 points for the day. Robbins' Abbott-Detroit received the record penalty for any one day, when the car ran into a protruding branch which went through the radiator. Two attempts were made to solder it and the car came in very late at Grand Rapids, where is was decided to replace the radiator. Anderson got an additional 1,000 points for his regular trouble of broken springs.

The last lap of the tour around the lake was from Grand Rapids to Chicago. Good gravel and fine macadam was the rule and all cars were running far ahead of the schedule speed of 20 miles an hour. This was the longest distance of any day's run on the tour, 217.8 miles. The route lay through Kalamazoo, Niles and South Bend. At Michigan City the home-coming tourists were met by a delegation from the Chicago Motor Club which es-

corted them into the city. With two exceptions, all the contesting cars made the last day's run without penalty. Monson had to do a little work on the engine of the Bergdoll, and found it necessary to refill the radiator 3 times, which cost him 12 points. Anderson was delayed by the same old trouble of broken springs and did not get in until very late.

When Ludington was reached on the Saturday run, the tourists were caught by the National car which had started as No. 8. This car was the entry of the Chicago Spring Wheel Company and is equipped with solid tires and the spring wheels made by that concern. Also although most of the contestants had no stop at all this car carried a fully enclosed limousine body. There were three drivers, including R. B. Gray, and the car had been on the road night and day until it caught the tour. The original cause of its delay the first day which put it more than 12 hours behind the tour and so caused its withdrawal automatically, was the loosening of a wheel.

Not only did the contesting cars have their troubles, but the official cars as well were laid up at times. The official cars are subjected to harder service than are the contesting cars, but all succeeded in coming through in fairly good order. The pilot car probably receives the hardest service of any one of the cars connected with a tour of this kind. The pilot must carry the bags of confetti which is strewn along the way so the tourists will know the right road to take, and must nose out detours in case the road is closed, must stop whenever a dangerous or exceptionally rough spot is encountered and mark it so that those who come behind will have an opportunity to slow down or avoid it. At the same time, the pilot car must go fast enough so that with all of these stops it does not delay the tour. The six-cylinder Kissel-Kar, driven by Harry Branstetter, carried the pilot practically all the way, although the rough service resulted in several broken springs. The Staver roadster which carried the tour officials and acted as pacemaker was on the job nearly all the time with Vaught at the wheel. Broken springs made trouble once or twice. The Midland, driven by Kavanaugh, was the starter's car and carried starter L. A. Watts. Its chief duties seemed to be pulling stranded cars out of mudholes along the way. It was on the job all the time and gave no trouble. The press car was an R. C. H., and made a fine showing, comparing favorably with some of the more expensive machines so far as getting through is concerned.

The troubles that caused penalties were:

Velie No. 1—Carbureter air intake screen stopped up with mud; second day, driver cut hole in screen and finally removed it; sixth day, slipping clutch, adjusted it twice.

Case No. 2—Fourth day, putting wire on magneto; fifth day, rear wheel off; sixth day, broken spring.

Staver No. 3—Second day, carbureter stopped up with mud and water.

Bergdoll No. 5—Steering knuckle broken in deep mud on second day; third day, took on water three times; fifth day, cleaning the mud out of and soldering radiator, adjusting push rod, late at control; sixth day, filling radiator with water five times, loose rear wheel, late at control; seventh day, taking on water three times, work on engine.

Abbott No. 6—Fourth day, replacing water lost through open drain pipe; sixth day, radiator ripped open by stick; worked on radiator; refilled radiator several times and finally put in a new one.

R. C. H. No. 7—Third day, took on water outside control; fourth day, withdrawn account of stripped gears and transmission.

National No. 8—First day, loose rear wheel, over 12 hours late at control, automatically withdrawn.

Velie No. 101—Withdrawn second day, no penalties. Driver forced to return on account of business.

Stutz No. 102—Second day, stripped gears, withdrawn.

Bergdoll No. 104—Second day, stuck in mud hole, pulled out with engine driven winch carried on car, 30 minutes late at control; fourth day, broken steering knuckle caused by running into tree.

Stutz No. 109—Second day, slight battery trouble, work on fender bent by broken tire chain, and lateness on account of helping other contestants out of the mud; third day, taking on water and fixing fender; fourth day, two springs broken on account of having to run on high gear alone, other gears being stripped; fifth day, broken spring; sixth day, broken spring.

R. C. H. No. 110—Frozen motor, withdrawn.

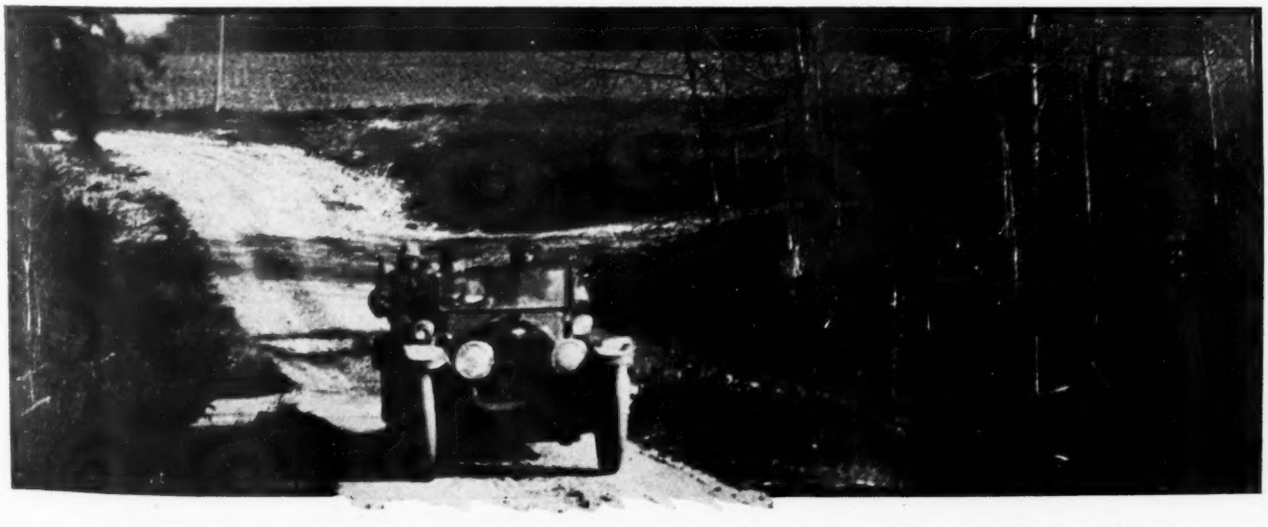
SCORES IN AROUND-THE-LAKE MOTOR RUN

TOURING CAR DIVISION

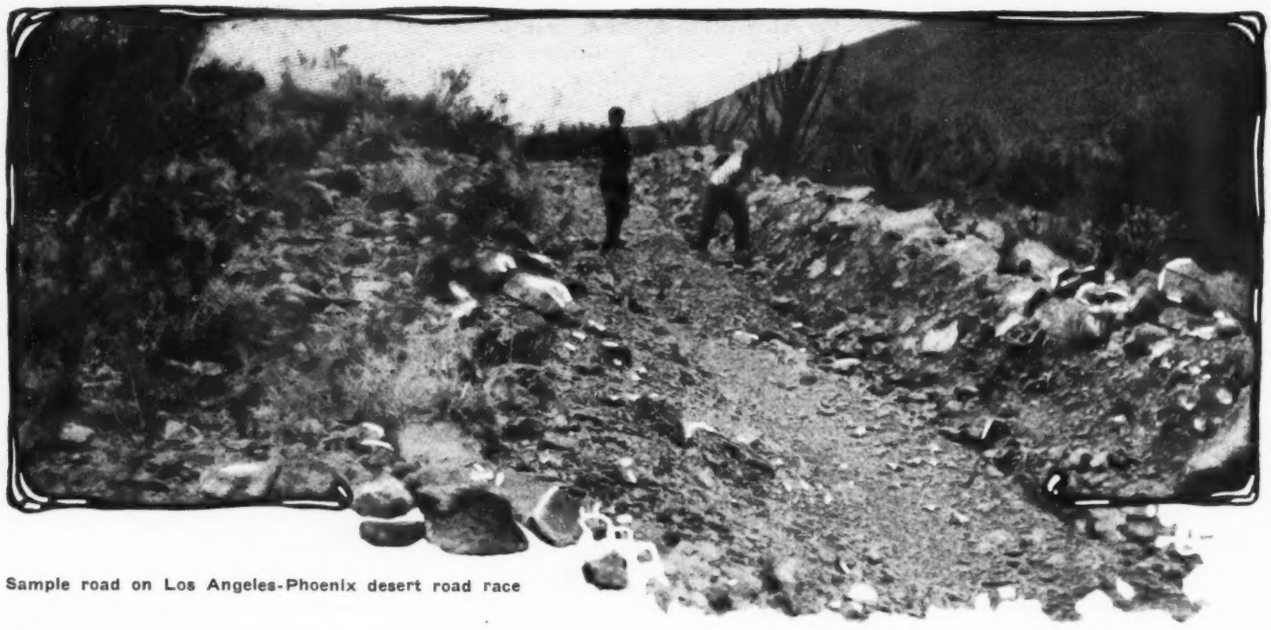
No.	Car and Driver	First Day	Second Day	Third Day	Fourth Day	Fifth Day	Sixth Day	Seventh Day	Total
1.	Velie—J. Brolley	0	2	0	0	0	3	0	5
2.	Case—J. Hanson	0	0	0	3	38	9	0	50
3.	Staver—G. Knudson	0	8	0	0	0	0	0	8
4.	Staver—A. Monckmeier	0	0	0	0	0	0	0	0
5.	Bergdoll—A. Monsen	0	161	9	0	52	64	12	298
6.	Abbott-Detroit—A. M. Robbins	0	0	0	3	0	1397	0	1400
7.	R. C. H.—H. Park	0	0	3	Withdrawn				
8.	National—Gray	Withdrawn							

ROADSTER AND TOY TONNEAU DIVISION

101.	Velie—Mort Luce	0	Withdrawn						
102.	Stutz—Bob Maypole	0	Withdrawn						
104.	Bergdoll—Tom Rooney	0	30	0	295	0	0	0	325
105.	Moline—Joe Wicke	0	0	0	0	0	0	0	0
106.	Moline—Frank Salisbury	0	0	0	0	0	0	0	0
109.	Stutz—C. Anderson	0	182	7	1186	57	1000	107	2539
110.	R. C. H.	0	Withdrawn						



A. M. Robbins had the radiator of his Abbott-Detroit ripped open by a protruding branch on the sixth day of the run



Sample road on Los Angeles-Phoenix desert road race

Franklin Phoenix Winner

Six-Cylinder, Air-Cooled Car Wins 511-Mile Desert Grind—Five Machines Finish Hard-Fought Race

Stevens-Duryea Wins Race From San Diego to Phoenix Covering a Distance of 400 Miles

Los Angeles—Phoenix, 511 Miles

No.	Car	Driver	Time
9	Franklin	Ralph Hamlin	18:10:22
3	Cadillac	Charles Soules	18:54:05
10	National	Fred Fuller	19:45:06
7	Cadillac	W. W. Bramlette	23:18:27
1	Cadillac	S. A. McKee	23:46:31

San Diego—Phoenix, 400 Miles

26	Stevens-Duryea	D. C. Campbell	16:49:20
25	National	J. B. Houston	18:55:00
28	Apperson	W. E. Fergusson	19:07:29
15	Mitchell	R. L. Greer	21:16:00
36	Simplex	J. C. Rice	58:53:00
16	Stutz	C. E. Washburn	38:50:00
22	Kissel	W. T. Coop	22:47:52

PHOENIX, ARIZ., Oct. 29—*Special Telegram*—Ralph Hamlin, in the now famous Los Angeles-Phoenix road race yesterday, realized the ambition of his life by winning this with a six-cylinder Franklin in 18 hours, 10 minutes 22 seconds for 511 miles across mountain and desert between these two cities. His speed averaged 28.1 miles per hour and he was nearly three-quarters of an hour ahead of his nearest competitor. In addition to the honor which goes with the winning of this the fifth desert race ending in this city Hamlin had to combat oceans of sand and mud and drive through torrents and over mesa where roads were washed away by one of the most severe storms in the history of the Southwest.

Second honors were taken by Charles Soules, in a Cadillac, whose time was 18 hours, 54 minutes and 5 seconds; a National, driven by Fred Fuller, was third, his time being 19 hours, 45 minutes and 6 seconds. Only two others of the original twelve cars entered in the contest finished. Both were Cadillacs, one was driven by W. W. Bramlette in 23 hours, 18 minutes and 27 seconds; and the other by S. A. McKee in 23 hours, 46 minutes and 31 seconds. It is a remarkable fact that all Cadillacs finished.

At Yuma, the halfway point where the cars were ferried across the Colorado River the position of the five winners was practically the same as at the end of the race. Hamlin put his Franklin in the lead just beyond Brawley and held his lead to the finish. His time at Yuma was 10 hours and 32 minutes. For 5 years Hamlin has been trying to win this race and each time after defeat he declared he would continue until victory rested with him. Today after his triumph he has announced that he is entirely through with the racing sport.

Conditions in this desert race were severe in the extreme. In many cases the roads were trails. Hamlin changed but two tires on his Franklin, both changes being made east of Yuma. Soules had little trouble with his Cadillac; Fuller's National had a few delays due to minor difficulties, and largely to the condition of the course; McKee lost his way and drove his Cadillac 8 miles off the course; he changed several tires.

Only one accident occurred in the race; at Vineyard Curve near Ontario, Cal., the Buick entry overturned and Louis Nikrent, the driver, had three ribs broken and Fred Nikrent, mechanician, was badly injured; both will recover. The Mercedes entry driven by Charles Bigelow, in avoiding a collision with the Buick on the curve, broke a radius rod which was temporarily repaired but which broke several times after, so that Bigelow lost 14 hours from this cause.

Several of the other entrants had various mishaps. The Schacht, driven by G. A. Ball, broke a rear axle near Glamis and lost 14 hours, and arrived in Yuma only 1 hour before the other cars left this control. Ball continued though he knew he was out of the money, and acted as a good Samaritan to other cars and had it not been for him some of them would never have reached Phoenix. The Schacht and Mercedes arrived late Monday night.

The Simplex, driven by A. G. Faulkner, had trouble with the drive chains and stuck several times in the mud. It spent Monday night on the desert 100 miles west of Phoenix.

One of the American entries, driven by Marc Bunnell, skidded into a viaduct before out of the city limits of Los Angeles and dished a wheel, causing the machine to pull out of the race east of Brawley. The other American entry, driven by W. B. Pipher, dropped out of the race about the same place supposedly due to axle trouble.

The Hupmobile entry, driven by Lonard Jones, withdrew near Brawley because of a broken axle.

While the race from Los Angeles to Phoenix was in progress there was also a race from San Diego to Phoenix, the two routes

uniting a few miles west of Yuma, where the night control was established. This part of the contest, namely, San Diego to Phoenix, was won by D. C. Campbell, driving a Stevens-Duryea, his time being 16 hours, 49 minutes and 20 seconds for the distance which is a little over 400 miles. Six other cars finished in the race between the cities of San Diego and Phoenix, these being:

Car	Driver	Time	Car	Driver	Time
National	J. D. Houston	18:55:00	Simplex	J. C. Rice	58:53:00
Apperson	W. E. Ferguson	19:07:29	Stutz	C. E. Washburn	38:50:00
Mitchell	R. L. Greer	21:16.00	Kissel	W. E. Coop	22:47:52

Nearly all of the San Diego cars had trouble of one nature or another, many of the cars from San Diego never reaching Yuma where they joined with the racers from Los Angeles to Phoenix. The Columbia, driven by W. H. Smith, cracked a cylinder jacket before reaching Yuma. The Winton entry, driven by W. H. Carlson, got stuck in an arroyo near Arlington and has not yet arrived at Phoenix. The Pope-Hartford, driven by L. W. Griffith, broke its frame near Dome. The crew repaired the damage with fence posts and bailing wire borrowed from a farmer. A fence post was placed parallel with each side member and bound to the frame by wire. In this condition the car reached Phoenix today.

The start was made in the Los Angeles-Phoenix race Saturday night, October 26, the first car leaving at 11:05 and the others at 5-minute intervals, the last car getting away at midnight. The night was bitter cold, and drivers and mechanicians were wrapped in blankets. While cold leaving California the desert held its mysteries in store for them as a storm had been raging for hours on it. Much of the course was muddy, the California portion not being bad, as the storm centered chiefly in Arizona. Between Yuma, the crossing point of the Colorado River, and Phoenix, deep gullies had been washed across the roads, and in places the roads had been entirely wiped out. At the Hassayampa river, 50 miles west of Phoenix, and also at Agua Fria, 16 miles west of Phoenix, both rivers were running bank full Sunday morning. At one time it was thought an extra control would have to be established at Hassayampa, which would mean that the cars would have reached Phoenix Tuesday morning. Fortunately, the Hassayampa subsided and mules were used to tow the racing machines across. No changes in position were caused by this inconvenience as the cars all reached Phoenix in the same order they checked out of Yuma.

The troubles of the course were not all confined to the losing cars: The National, in the San Diego race, caught fire near Tolamas on the Arizona side of Yuma, due to carbureter troubles and burned out all connections. A 2-hour delay resulted. Later it changed three tires near Dome. The Apperson had two punctures due to nails in the same place. The Apperson in avoiding a rear-end collision with the Stevens-Duryea, which won this race, did so at the expense of a broken radiator. The Stevens-Duryea was halted and the Apperson driver following closely had to go into a deep arroyo or over a bank to avoid a collision. He chose the former course and broke his radiator which, however, was soon repaired and he finished fourth. The Stutz had motor trouble.

For 3 years the race from Los Angeles was across the desert by Mecca, across the Colorado at Ehrenberg and thence on over the Arizona mesas to Phoenix. Last year it was changed to pass through San Diego and Yuma. This year still another change was made and San Diego was left off the course. On the California side the principal towns through which the route passes are Alhambra, El Monte, Puente, Lemon, Walnut, Spadra, Pomona, Ontario, Bloomington, Colton, Beaumont, Banning, Palm Springs, Mecca, Brawley, Mammoth, Glamis and Ogleby. The Yuma control is the first stop on the Arizona side of the Colorado. It was from this place that the cars in both races started Monday, passing through Dome City, Middle Wells, Palomas, Agua Caliente, Arlington, Buckey and on to the fair grounds, which are situated on the outskirts of Phoenix.

The crossing of the Colorado river at Yuma was accomplished without special incident. This crossing is a clumsy affair, the ferry service being antique. It progressed slowly on account of the high water but no accident was reported.

It is at Yuma that the two race routes converge. The San Diegans raced across the Southern California desert by way of El Centro and Holtville.

There is little to choose between the two courses. Up to 2 weeks ago 45 miles of the desert between Holtville and Yuma had never been crossed by an automobile. The first car to cross that waste was a Premier, driven by J. L. Fernando with M. J. Farlow as mechanician. Fernando and Farlow were lost a night and a day on the desert and had a terrible experience. They encountered sand so deep that even after they had deflated their tires the only way they could progress was to leap out and push from behind, letting the car steer itself.

Before the day of the race the routes were placarded thoroughly. Between Holtville and Yuma there was a flag every 2 1-2 miles and five gallons of water.

Only those who have participated in the long desert grind can know the fatigue and hardship which the drivers and mechanicians endure. To ride at a speed of 40 or 50 miles an hour over desert roads is to take one's life in his hands. During his trial trip Fernando threw out one mechanician in rounding a sharp curve and took him back to San Diego with several broken ribs.

The prize money offered for the Los Angeles event totals $5,200, while the winners of the San Diego race will divide $6,275.

ENTRIES IN THE LOS ANGELES-PHOENIX DIVISION IN THEIR ORDER OF STARTING

Car	Driver	Time	Car	Driver	Time
1 Cadillac	S. A. McKee	11:05	7 Cadillac	W.W.Bramlette	11:35
2 American	W. B. Piper	11:10	8 Buick	Louis Nikrent	11:40
3 Cadillac	Chas. Soules	11:15	9 Franklin	Ralph Hamlin	11:45
4 American	Marc Bunnell	11:20	10 National	Fred Fuller	11:50
5 Simplex	Al G. Faulkner	11:25	11 Mercedes	Chas. Bicelow	11:55
6 Hupmobile	Lonard Jones	11:30	12 Schacht	G. A. Ball	12:00

ENTRIES IN THE SAN DIEGO-PHOENIX DIVISION IN THEIR ORDER OF STARTING

Car	Driver	Time	Car	Driver	Time
15 Mitchell	R. L. Greer	10:15	29 Tincher	H. A. Lees	11:25
17 Buick	S. Campbell	10.25	30 Knox	Not named	11:30
18 Mercedes	C. T. Johnson	10:30	32 Premier	J. L. Fernando	11:40
20 Franklin	Frank Carlson	10:40	33 Michigan	Chas. Giletrap	11:45
21 Studebaker	F. C. Wood	10:45	34 Buick	C. W. Biggs	11:50
24 Knox	E. De Lovelace	11:00	35 Kisselkar	Alf. Chenowith	12:00
27 Pope-Toledo	E. W. Ballert	11:15			

WINNERS OF THE PAST THREE PHOENIX DESERT RACES

Year	Car	Distance	Time	Average miles per hour
1912	Franklin	511 miles	18:10.22	28.1
1911	National	542 miles	20:22.00	26.6
1910	Kissel	418 miles	15:49.00	26.5

Hoosiers Improving Speedway Stands

INDIANAPOLIS, IND., Oct. 28—The Indianapolis Motor Speedway is to tear down the present press stand, judges' stand, refreshment and executive buildings and all other stands grouped near the start and finish line and behind the pits.

One large, modern pagoda building is to supplant the entire lot. This building will accommodate those in charge of the race in the following way:

On the lower, or ground floor, will be located the telegraph and electrical appliances. On the second floor will be the timing and scoring devices. The press will be taken care of on the third floor, and on the fourth floor the judges and officials will have high, roomy accommodations. The fifth floor is for the management and executives.

These plans have been ratified by Carl G. Fisher, president of the Indianapolis Motor Speedway Company, and the building is now in progress.

Other changes being incorporated by the manager of events, Charles W. Sedwick, are the installation of more efficient scoring service and a general improvement in the utilization of parkage and paddock space.

Mr. Sedwick sails about November 1 for Europe, where he will discuss the May race meet with the most prominent European manufacturers. Entries are open January 1, and in the meantime Mr. Sedwick expects to have the greatest field of entries lined up that ever faced a starter.

Minor Contest News of the Past Week

Charles J. Glidden and party arriving at New Orleans

SEVERAL rulings were made at the meeting of the Contest Board of the American Automobile Association last week covering appeals, disqualifications, etc. The gist of the rulings follows: Studebaker Corporation appeal in Minneapolis-Winnipeg run against disqualification for cutting course was dismissed and class trophy awarded to Hupmobile.

The Pittsburgh-Mercer Auto Company was suspended until January 1 for mis-advertising contestants in a non-stock meeting as stock cars.

The George C. Brinkman Motor Car Company of St. Louis was suspended until January 1 for failure to start a Nyberg car entered at a recent race meeting.

Charles W. Canner, registered driver, was suspended until January 1, 1915, and E. V. Rickenbacher, January 1, 1914, for participation in various unsanctioned race meetings in Iowa and Nebraska, where Canner campaigned the Marshall Flying Squadron and met with some serious mishaps owing to the carelessness and disregard of the precautionary rules of A. A. A.

Three Clean Scores in Michigan Run

GRAND RAPIDS, MICH., Oct. 28—After a 400-mile trip through Western Michigan the reliability run given under the auspices of the Grand Rapids *Herald* and the Grand Rapids Automobile Club, pulled into Grand Rapids, bedraggled and mud-stained, but with three of the drivers happy in the fact that they had attained perfect scores. The final results showed points penalized as follows:

Car	Driver	Observer	Total penalties
Cutting	Riekse	Roth	234
Reo Fifth	Vandecar	Fiske	0
Ford	Vallade	Leonard	88
Cadillac	Eckburg	Wilcox	0
Overland	Oswald	DeWindt	868
Marmon	Kramer	Shank	1
Oakland	Austin	Bancroft	0

The first day's run was 114 miles to Ludington. The second day 98 1-2 miles were covered to Traverse City. The third day was from Traverse City to Cadillac and the fourth day brought the tourists home. Many courtesies were extended to the travelers by residents of towns along the route. The tour proved such a success that it probably will be repeated next year.

1,500 at York's Track Races

YORK, PA., Oct. 28—The race meeting held here on Saturday consisted of four events, the fifth race a free-for-all at 10 miles being declared off when Gillard's Pullman turned turtle after going 3 miles. The driver and his mechanic were seriously hurt. The fields were very small and the only close contest resulted from the running of the handicap wherein the Buick won on its time allowance.

The Lancaster Motor Club ran a sociability tour to the track and the participants were the guests of the York Motor Club for the afternoon. About 1,500 attended the races.

The summary follows:

Car	Driver	Time	Car	Driver	Time
5-MILE, NON-STOCK,			201 CU. IN.		
Mercer	W. Freitag	6:29.25	Ford	C. Lambright	7:05.45
5-MILE, NON-STOCK,			451 CU. IN.		
Kline	John Menker	6:03.15	Pullman	Gillard	6:24
5-MILE, NON-STOCK,			601 CU. IN.		
Kline	John Menker	6:08.25	Pullman	Gillard	6:22.25
5-MILE, FREE-FOR-ALL			HANDICAP		
Buick	J. W. Richley	7:09.45	Ford	C. Lambright	7:11.25
Kline	John Menker	7:12			

In this event Menker's actual running time was 6:02 or an average of one mile in 1:12. Menker broke the track record, which was held at 1:14.

Disbrow Stars on Louisville Track

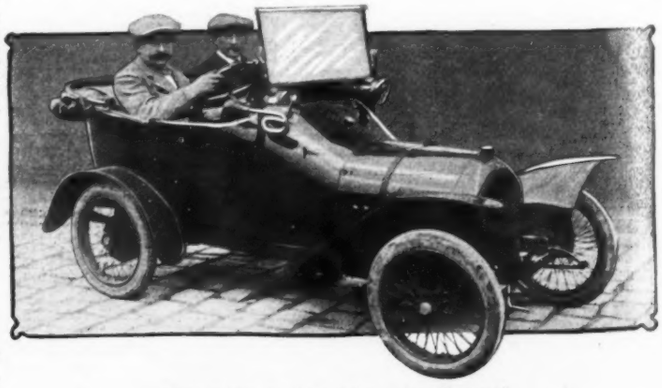
LOUISVILLE, KY., Oct. 27—Over the historic 1-mile dirt racing track at Churchill Downs, nine well-contested automobile races were run this afternoon. About 3,000 persons witnessed the events. The exhibition of Louis Disbrow, driving his Simplex Zip and his 290-horsepower Jay-Eye-See, was the feature. No records were lowered. The summary follows:

Car	Driver	Time	Car	Driver	Time
Exhibition Trials—1 Mile					
Simplex	Disbrow	:53.40	Case	Endicott	:57.20
Case	Nikrent	:57	Lozier	Martin	1:05
Hotchkiss	Kilpatrick	:57			
5-Mile Race					
Case	Nikrent	5:21.40	Case	Endicott	
1-Mile Exhibition					
Jay-Eye-See	Disbrow	:58			
Pursuit Race—5 Miles					
Simplex	Disbrow	5:45	Case	Nikrent	
Hotchkiss	Kilpatrick		Case	Endicott	
2 Miles					
Jay-Eye-See	Disbrow	2:08			

Disbrow also won a 5-mile race in his Simplex in 5:22 and Nikrent took the 3-mile handicap in a Case in 3:05.

Glidden Arrives at New Orleans

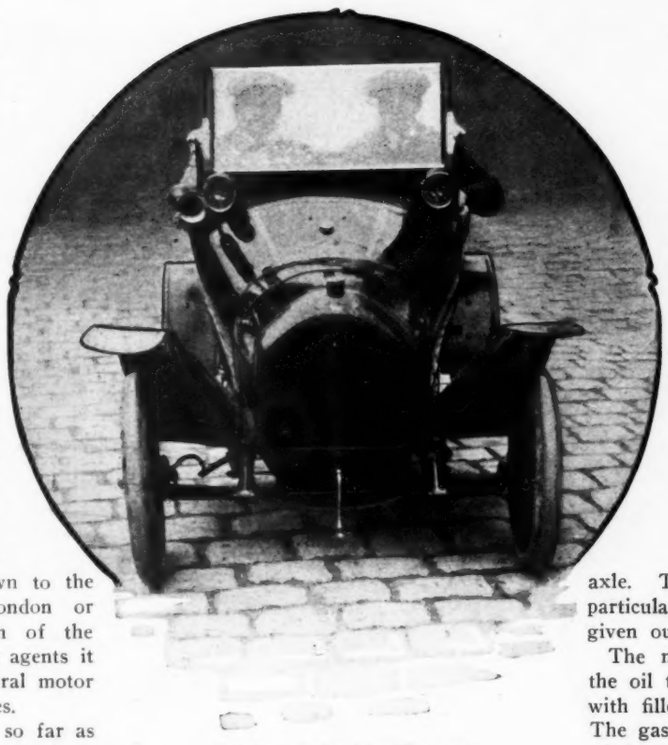
NEW ORLEANS, Oct. 28—Charles J. Glidden, donor of the Glidden Trophy and one of the leading automobilists of the country, completed the route laid out for the abandoned national tour and arrived in this city on schedule time. The program that had been arranged to welcome the national tour was carried out in modified form in honor of Mr. Glidden's party.



Side view of the baby Lion-Peugeot

Lion-Peugeot Introduces Small Runabout

PARIS, Oct. 11—France is at present showing a decided preference for what have been termed baby cars —small, light, two-seaters, costing little more than a first-class motorcycle and having about the same upkeep cost. Up to recently these machines have been produced by firms of comparatively little importance. but rumor has had it that the Peugeot company, one of the most important in France, intended to enter the market with a big series of baby cars, the designs for which had been entrusted to Ettore Bugatti, a very successful engineer, and producer of the high-grade Bugatti car. It was not expected that the new Peugeot would be shown to the public before either the London or Paris shows, but by reason of the activity of one of the selling agents it was revealed at the agricultural motor exhibition just held at Bourges.

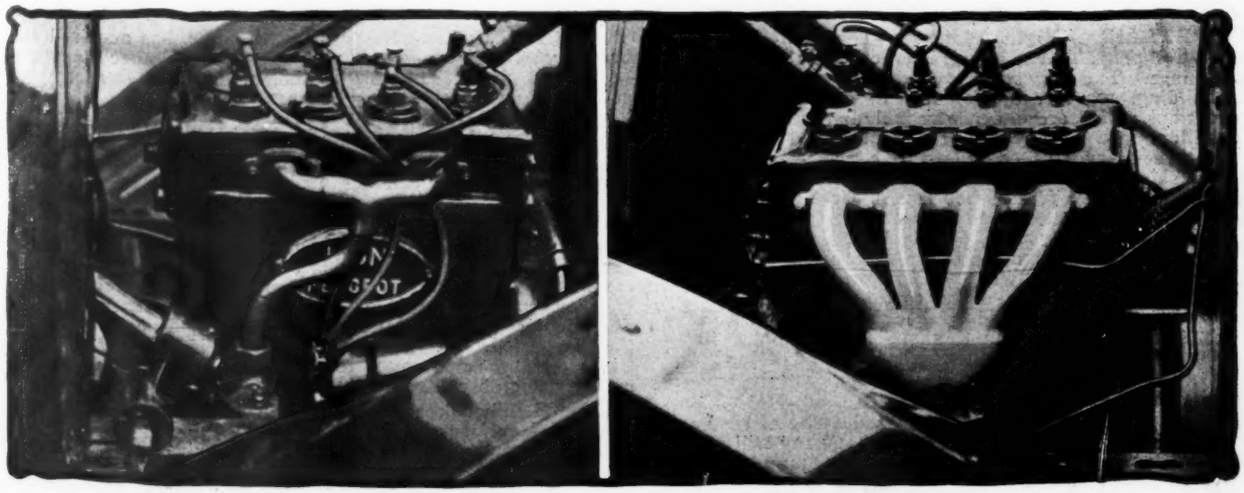


Front of Baby Lion-Peugeot

The baby Peugeot is built, so far as its external appearance is concerned, on big car lines; its dimensions, however, are decidedly diminutive, it being so low and light in appearance that it really has all the appearance of a baby car. The power plant comprises a four-cylinder block motor of only 2 by 3.5 inches bore and stroke. The valves are on opposite sides and are of large diameter; the timing gears are in front, with the magneto on the intake side having its shaft parallel with the motor shaft. The carbureter is a Claudel. A novel feature of the machine is the casting of the four cylinders and the whole of the crankchamber in one piece. The base plate is independent and is bolted on, and there are detachable end plates to receive the two main bearings, but on this point no definite information could be obtained from the agents in charge of the car, and an external examination did not reveal the exact nature of the construction. The motor is bolted directly on the underpan, this latter being of stiffer material than is usually employed and bolted to the channel section side-frame members. With this construction it is obviously impossible to make any internal examination of the motor without lifting it entirely out of the chassis, but owing to its small area and very low weight this is by no means a difficult task. The power is transmitted through a cone clutch, a two-speed gearset and a propeller shaft to a floating rear axle. The gearset is a special type, particulars of which have not yet been given out.

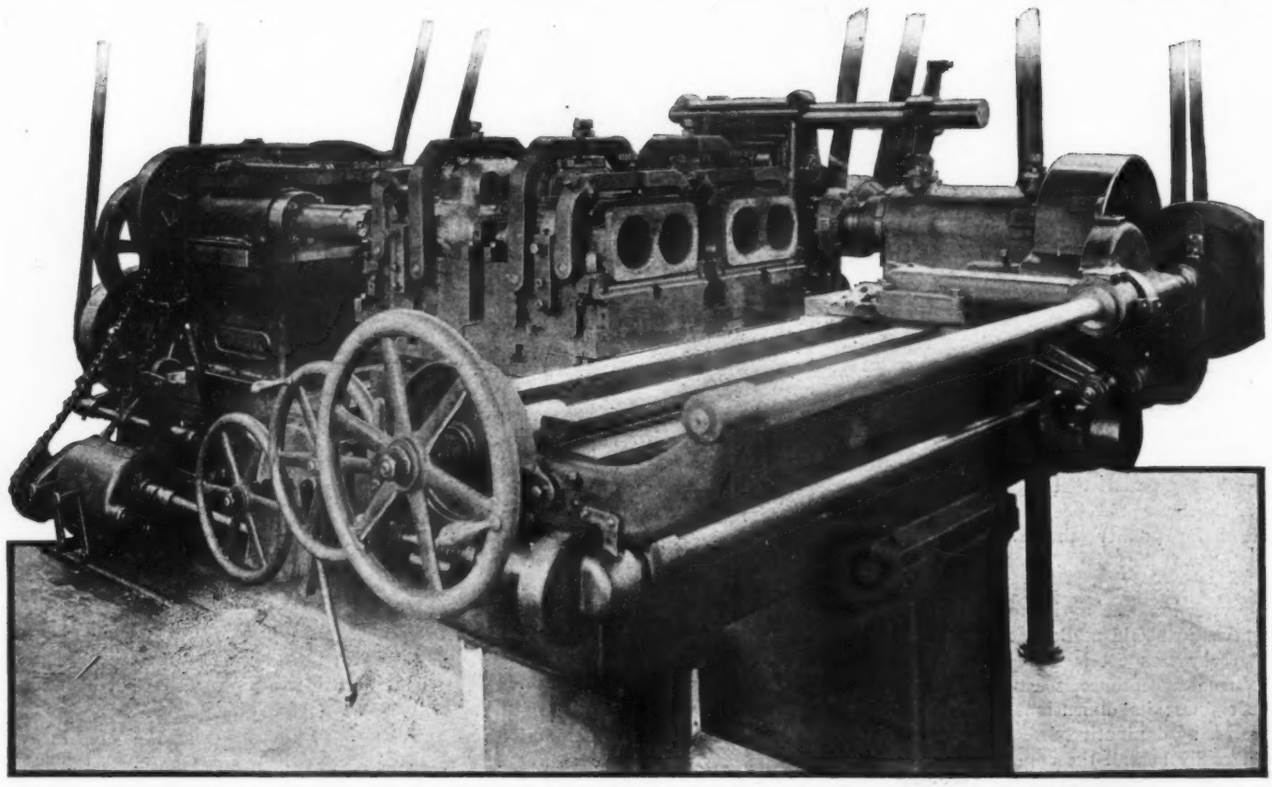
The motor is lubricated by splash, the oil tank being in the scuttle dash, with filler cap on the outside of the dash. The gasoline tank is built in the back of the rear seats, the top being polished mahogany and hidden by the hood when this latter is down. Front suspension is semi-elliptic and the rear springs are really the half of a semi-elliptic spring inverted, the thick end being attached to the frame member and the forward end of the main blade to the rear axle housing. Truffault shock-absorbers are fitted front and rear. The car is supplied with wire wheels having 22 by 2 1-2-inch tires, and is listed complete with two-seater body, three lamps, acetylene generator within the scuttle dash, horn and tools at $800 retail.

This car has been specially designed by the makers to meet the low-priced American car on the French market and in French, European and African possessions.



Intake and exhaust sides of Lion-Peugeot baby motor recently brought out for the French trade

Factory Miscellany



Machine used for boring and milling cylinders in the factory of the Lozier Motor Company, Detroit, Mich.

Boring and milling the cylinders, unless carefully handled, can become an enormous factor in the output cost of the factory. The above illustration shows the Beaman & Smith boring and milling machine as used in the Lozier factory at Detroit, Michigan. This shows the complete machine with the milling appliance in the foreground. Eight cylinders can be operated upon simultaneously. Four are bored, while the other four are in the milling part. As will be noted in the illustration, the cylinders are mounted upon a turntable, which permits them to be reversed when one of the operations is completed. After having completed the boring operation, the operator of the machine swings the turntable about and the cylinders which have just been bored are in position for milling. A fresh set of cylinders is inserted in the turntable for boring and the work proceeds. It takes but one man to handle the machine and the boring and milling of each set takes about 30 minutes. The machine can be run continuously throughout the working day, and in that time will turn out approximately twenty full sets. The size to which the cylinders are bored can be regulated on this machine by simply fitting into the boring chuck the cutter of the required diameter. The operation of the boring and milling divisions of the machine is entirely simultaneous and is to a great degree automatic in that after the job is set up it only requires the active attention of the operator when it becomes necessary to swing the set of cylinders from the boring to the milling side and to set up the new job, an operation requiring 4 minutes. It is estimated that the time saved on this job is more than 100 per cent.

OVERLAND'S Eight Additions—The Willys-Overland Company, Toledo, Ohio, is erecting eight new buildings. The largest of the group is a five-story concrete building, 102 feet by 127 feet in dimensions. Other constructions which are under way include a two-story concrete building, 50 feet by 140 feet, to be used as a repair shop; a three-story, 60 feet by 80 feet concrete building, for the varnishing and trimming departments; a three-story concrete structure 40 feet by 100 feet, for polishing, plating, pattern making and pattern storage; a two-story frame building covered with iron siding, 65 feet by 216 feet, for wheel painting and trimming; a 34 by 48-foot brick addition to boiler room for housing two 300-horsepower boilers; a one-story frame iron-covered addition to forge shop, 32 feet by 55 feet; a one-story steel and brick construction, 70 feet by 200 feet, to serve as a blacksmith shop. These buildings represent an outlay of several hundred thousand dollars and when finished will house 2,000 workmen.

Paige Company's Addition—The Paige Auto-Hoist Company, Grand Rapids, Mich., has purchased a site at that city on which a factory will be erected. The company will manufacture a device for lifting the weight of an automobile from its tires while not in use.

Jeffrey-DeWitt's Factory—The Jeffrey-DeWitt Company, Detroit, Mich., manufacturer of spark-plugs, has acquired an additional factory which it will operate in connection with its present plant. The new building will house the assembly and shipping departments.

Stewart's Plant—The W. F. Stewart Company, Flint, Mich., states that the plant which it is erecting will be used for the manufacture of metal automobile bodies for pleasure cars and is designed to produce 100 complete bodies per day. The company is interested in the purchase of metal automobile body making machinery.

Lavigne Leases Plant—The Lavigne Gear Company, of Corliss, Wis., and Detroit, Mich., which moved its plant and equipment from Detroit to Corliss about a year ago and which was reported to have been contemplating a return to the Michigan metropolis, has leased the big Racine plant of the Racine-Sattley Company, of Racine, Wis., and Springfield, Ill., and will occupy 50,000 to 75,000 feet, beginning Monday morning, October 28.

Kissel's Milwaukee Plant.—The Kissel Motor Car Company, of Hartford, Wis., expects to be able to take occupancy of its new branch plant at Milwaukee, Wis., on or about November 15. The work of rearranging the new plant, formerly the Romadka trunk factory, is progressing rapidly, and some of the equipment is now being installed. Improve-

ments to the main plant at Hartford are being completed, the new buildings having been equipped and put into condition for continuous operation.

Vinot Enlarges—The Vinot Car Company, Montreal, Que., is having plans prepared for a new factory.

St. Paul Company Builds—The Peteler Car Company, St. Paul, Minn., has acquired a site covering about 23 acres and will erect a factory.

Hudson Plans Additions—The Hudson Motor Car Company, Detroit, Mich., plans to add two more buildings to its plant, bringing the total floor space up to 363,611 square feet.

Ware Company Builds—The Ware Motor Company, Minneapolis, Minn., has under way the construction of a much larger factory than it has maintained and shipments will begin January 1.

Standard Oil Buys—Interests allied with the Standard Oil Company are said to be negotiating for the purchase of the factory and good will of the Knox Automobile Company, Springfield, Mass.

Deny Building Report—An official denial of the report that they are going to build a factory at St. Louis, Mo., is being sent broadcast by the Swinehart Tire & Rubber Company, Akron, Ohio.

Build Brick Factory—The American Automobile Trimming Company, Detroit, Mich., has made arrangements for the erection of a three-story brick building on Meldrum and Berlin avenues, that city.

Jackson Rim Adds—A contract has been awarded for the erection of an addition of a one-story factory 80 feet by 100 feet by the Jackson Rim Company, Jackson, Mich. The estimated cost is to be $40,000.

Another Body Plant—J. A. Fitzsimmons, Lindsay, Ont., will start work at once on a new two-story brick factory for the manufacture of aluminum automobile bodies. Complete new machinery will be purchased.

Chase Visits Havers Plant—A. F. Chase, Minneapolis, Minn., distributor of the Havers car, recently visited the factory of the Havers Motor Car Company, Port Huron, Mich., and after going over the line carefully placed an order for one hundred and fifty cars.

Detroit Adds Body Plant—With the addition of a body building plant to manufacture every sort of body, Detroit again gains. An organization of New York millionaires is at present forming a $200,000 corporation with John Mackay and H. D. W. Mackay as the leading directors.

Ford Leases Property—The Ford Motor Company, Philadelphia, Pa., has leased property at Sixteenth street and Washington avenue, that city, and will establish an assembly plant on the site. The acquisition of this property will also give the Ford company the benefit of its own railroad siding.

Cleanliness Garford Factor—Cleanliness is made an important factor in the Elyria, Ohio, plant of the Garford company. Every department of the plant is kept as clean and free from litter as a big force of shop white wings can make it. Parts and materials are neatly piled and the passageways are never obstructed.

Gramm-Bernstein's Truck—The first truck completed by the $500,000 Gramm-Bernstein Company, at Lima, was finished recently. It is of three and one-half tons capacity and the company will complete 250 of them by spring. The plant has been in operation for about four weeks and employs seventy-five men.

To Enlarge Plant—Additions and improvements costing $10,000 will be made by the M. E. Blasier Company, Utica, N. Y., to the building which it occupies at the present time. A four-story brick structure 21 feet by 60 feet will be built in the rear of the present plant, which will be enlarged by the addition of two stories. The company manufactures automobile tops.

To Make Automobile Tires—The Stens Manufacturing Company, Springfield, Mass., capitalized at $200,000, has bought land in the vicinity of Wood Pond on the line of the New Hampden Railroad and will build a three-story factory building 100 feet by 40 feet in size with basement, of brick and concrete. The company was organized last summer to manufacture automobile tires.

Adler-Werke's Increase—The Adler-Werke, Eagle Works, at Frankfort, Prussia, were formed by H. Kleyer, who commenced business in a small shop in 1880. His receipts in that year amounted to $2,248, whereas now the Adler Werke's annual production approximates $4,500,000 and is increasing from year to year, making enlargement of the plant frequently necessary. The works employ about 5,000 operatives and 500 clerks.

Calendar of Coming Automobile Events

Shows, Conventions, Etc.

Jan. 2-10.....New York City, Importers' Salon, Hotel Astor, Importers' Automobile Alliance.
Jan. 4-11.....Cleveland, O., Annual Automobile Show.
Jan. 4-11.....Montreal, Que., Montreal Motor Show, Drill Hall and 65th Regiment Armory.
Jan. 11-25.....New York City, Thirteenth Annual Show, Madison Square Garden and Grand Central Palace, Automobile Board of Trade.
Jan. 20-25.....Philadelphia, Pa., Annual Automobile Show.
Jan. 25-Feb. 1.....Montreal, Que., Automobile Exhibition, R. M. Jaffray, Manager.
Jan. 27-Feb. 1.....Detroit, Mich., Annual Automobile Show.
Jan. 27-Feb. 1.....Scranton, Pa., Annual Automobile Show, Hugh B. Andrews.
Feb. 1-8.....Chicago, Ill., Annual Automobile Show.
Feb. 10-15.....Minneapolis, Minn., Annual Automobile Show.
Feb. 11-15.....Ottawa, Ont., Annual Automobile Show.
Feb. 15-22.....Newark, N. J., Annual Automobile Show, First Regiment Armory, New Jersey Automobile Exhibition Company.
Feb. 17-22.....Kansas City, Kan., Annual Automobile Show.
Feb. 24-Mar. 1.....Cincinnati, O., Annual Show, Music Hall, Cincinnati Automobile Dealers' Association.
Feb. 24-Mar. 1.....Omaha, Neb., Annual Automobile Show.
Feb. 24-Mar. 1.....St. Louis, Mo., Annual Automobile Show.
March 3-8.....Pittsburgh, Pa., Annual Automobile Show.
March 8-15.....Boston, Mass., Annual Automobile Show.
March 17-22.....Buffalo, N. Y., Annual Automobile Show.
March 19-26.....Boston, Mass., Annual Truck Show.
March 24-29.....Indianapolis, Ind., Annual Automobile Show.

Race Meets, Runs, Hill Climbs, Etc.

Oct. 31.....Track—Phoenix, Ariz., Maricopa Auto Club.
Nov. 9.....Sociability Run, Louisville, Ky., Louisville Automobile Club.
Nov. 29-30.....Richmond, Va., Track Races, State Fair Grounds, Richmond Automobile Club.
May 30.....Indianapolis, Ind., 500-Mile Race, Speedway.

Proposed Contests

Nov. 3-5-6.....Track—Shreveport, La., Shreveport Auto Club.
Nov. 15-16.....Track—Richmond, Va., Richmond Automobile Club.
Nov. 28.....Road Race—Visalia, Cal., W. H. Lipton.

Foreign

Nov. 2-3.....Versailles, France, Splash Guard Competition.
Nov. 8-16.....London, England, Olympia Automobile Show.
Dec. 7-22.....Paris, France, Paris Automobile Show, Grand Palais.
Jan. 11-22.....Brussels, Belgium, Annual Belgian Automobile Show, Centenary Palace.
April .....Barcelona, Spain, International Exhibition.

Atlas Purchases Plant—Through the purchase of the Atlas Engine Works by the Lyons-Atlas Company, Indianapolis, Ind., recently the Knight sleeve-valve engine receives another impetus from a production standpoint which bids fair to place it on a more advantageous basis than ever before in this country. The new company will take possession of the new plant, which covers sixty-seven acres, at once, and will begin the manufacture of Knight engines for the trade.

New Departure Busy—The New Departure Manufacturing Company, Bristol, Conn., manufacturers of the well known American-made New Departure ball bearings, has been working 127 hours a week in all departments and 152 hours a week in some departments with day and night shifts of skilled mechanics to meet the large demand for these goods. Factory additions are now in process of construction. These additions will give nearly 75,000 square feet of floor space which will be available late in the fall of the present year.

New plant of the Ignition Starter Company, manufacturers of Disco starters, Detroit, Mich.

BAKER'S Sales Convention—Eighty-five dealers and salesmen were present at the Dealers' and Salesmen's Convention held at the Cleveland, Ohio, factory of the Baker Motor Vehicle Company, October 16, 17 and 18. Addresses were made by G. H. Kelly, W. P. Kennedy and other officials of the company. The accompanying illustration shows about two-thirds of the total number of men present asembled before the factory.

Barrett with Stratton—S. W. Barrett is now in charge of the stock department of the E. V. Stratton Company, Albany, N. Y.

Stromberg's Detroit Branch—The Stromberg Motor Devices Company has opened a Detroit, Mich., branch with N. H. Minniter in charge.

Baxter Sales Manager—William A. Baxter of Dayton, O., has recently been appointed sales manager of the Pan-American Motors Company, San Francisco, Cal.

Day and Night Service—M. E. Grable, Boston, Mass., who has been appointed New England district manager for the Universal truck, has inaugurated a day and night service for the owners of these vehicles.

Trade Men Organize Fraternity—A number of automobile owners, drivers and others identified with the motor car trade have organized the Fraternal Order of Honk Honks, which will have its headquarters at Anderson, Ind.

Tire Branches Consolidate—Since the consolidation of the Diamond and Goodrich companies of Akron, O., the two Columbus, O., branches have been consolidated with the former Diamond branch at 186 East Gay street under the management of H. S. Smith.

Goodyear's Indianapolis Warehouse—The Goodyear Tire and Rubber Company has begun the construction of a new business and warehouse building at Walnut street and Capitol avenue, Indianapolis, Ind. It will be 50 by 200 feet, of fireproof construction and will cost $107,000.

Columbus Wants Automobile—Bids will be received by Director B. L. Bargar of Columbus, O., November 4, for two gasoline automobiles for use in the fire department.

Will Build Garage—A building permit has been issued at Lima, O., for the construction of a garage on North Main street by J. A. Ireton.

Michigan's Good Road Campaign—The Michigan Good Roads Association has begun another campaign for membership and has become especially active in Detroit in its efforts to promote a good road along the Detroit and Toledo route through Monroe for which the Boards of Commerce of Toledo and Detroit have contributed $3,000.

Extend Minnesota Road—Business men between Rockford and Glenwood on the Soo line in Minnesota have organized to extend the state road from Minneapolis to Glenwood through Rockford under the Elwell road law which distributes one-half the cost to the state, one-fourth to the county and one-fourth to the property improved.

Mail Collectors Mechanics—Several months ago the Columbus, O., postoffice permitted the mail collectors which had been operating the automobile collection wagons, to take over the cars and gave each an allowance of $1,000 for maintenance. Since that time the collectors have become mechanics and are making quite a saving by making all adjustments themselves.

Mississippi's Road Improvement—Mississippi statistics show that during the past two years $5,867,900 in bonds have been issued for road improvement. In nearly every case the bonds brought par. This does not include expenditures for this purpose made from funds on hands. In addition automobile clubs and individuals have contributed considerable sums for road improvement.

Cost of Indianapolis Roads—More than $25,000 has been added to the Indianapolis, Ind., city treasury this year by automobile licenses. On January 1, 1912, there were 188 miles of paved streets in the city. Since that date contracts for paving streets have been awarded amounting to about $500,000. Street cleaning this year will cost the city $120,000; repairing and maintaining unimproved streets, $55,000, and repairing paved streets, $85,000.

Overland Helps Y. M. C. A.—The Willys-Overland Company has made possible the proposed complete course of instruction in the care and operation of an automobile to be offered by the Y. M. C. A. of Toledo, O., in its night classes, by presenting the association with a complete demonstrating apparatus. The use of this apparatus will give students a large amount of actual repair work in the shop. The school opened recently and is in charge of W. F. Morris, mechanical expert of the Union Supply Company.

Gathering of salesmen and dealers of the Baker Motor Vehicle Company during their recent convention at the factory of the

New Agencies Established During the Week

PLEASURE CARS

Place	Car	Agent
Asheville, N. C.	Alco	Asheville Auto Co.
Attleboro, Mass.	Cole	Pawtucket Auto Co.
Baltimore, Md.	Kline	Neeley & Ensor
Bath, Me.	R-C-H	H. Washburn
Boston, Mass.	Chevrolet	Republic M. C. Co.
Boston, Mass.	Little	Republic M. C. Co.
Brooklyn, N. Y.	Kline	C. & C. Auto Co.
Bryan, Tex.	R-C-H	Dr. P. M. Rausor
Buffalo, N. Y.	Kline	Windsor M. C. Co.
Center, Tex.	R-C-H	H. C. Parker
Charlotte, N. C.	Kline	E. T. James
Chattanooga, Tenn.	Alco	Auto Repair Co.
Chillicothe, Mo.	R-C-H	H. L. Gilbert
Columbus, O.	Reo	R. F. Boda & Co.
Denver, Colo.	Little	W. Thorney Auto Co.
Denver, Colo.	Palmer & Singer	W. W. Barnett
Denver, Colo.	Stutz	Hall Auto Co.
Dorranceton, Pa.	Kline	Gilbert H. Edgar
Erie, Pa.	Alco	Star Garage Co.
Flora, Ind.	R-C-H	Greider & Hawkins
Franklin, Pa.	Kline	King Auto Co.
Grand Rapids, Mich.	Alco	E. A. Merrill
Harrisburg, Pa.	Abbott-Detroit	Harrisburg Auto Co.
Harrisburg, Pa.	Autocar	Andrew Redmond
Harrisburg, Pa.	Cadillac	Crispen M. C. Co.
Harrisburg, Pa.	E-M-F	Keystone M. C. Co.
Harrisburg, Pa.	Flanders	Keystone M. C. Co.
Harrisburg, Pa.	Hudson	I. W. Dill
Harrisburg, Pa.	Maxwell	Andrew Redmond
Harrisburg, Pa.	National	Harrisburg Auto Co.
Harrisburg, Pa.	Oakland	Harrisburg Auto Co.
Harrisburg, Pa.	Overland	East End Auto Co.
Harrisburg, Pa.	Reo	Harrisburg Auto Co.
Harrisburg, Pa.	Stanley	Paul D. Messner
Harrisburg, Pa.	Studebaker	Keystone M. C. Co.
Hartford City, Ind.	R-C-H	K. P. Carroll
Johnstown, Pa.	Kline	Atlas M. C. & Sup. Co.
Kankakee Ill.	Alco	Kankakee M. C. Co.
Kossuth, Pa.	R-C-H	G. E. Kelly
Lancaster, Pa.	Kline	S. E. Bailey & Co.
Littlestown, Pa.	Kline	L. M. Alleman
Los Angeles, Cal.	Selden	Leslie Co.
Lowell, Mass.	Cadillac	Walter Perham
Lowell, Mass.	Stutz	Arthur J. Cummiskey
Memphis, Tenn.	Alco	Tri-State Chalmers Co.
Montreal, Que.	Cole	Royal Auto Co.
Montreal, Que.	Overland	W. J. O'Leary & Co.
Montreal, Que.	Hupmobile	Victor Octave Reed
Morristown, N. J.	Franklin	A. M. Guerin
Mt. Bullion, Cal.	R-C-H	J. J. Youd
Mulberry, Ind.	R-C-H	Burkhalter Bros.
Newark, N. J.	Kline	A. N. Brunner
New Bedford, Mass.	Hudson	O'Neil Auto Co.
New Bedford, Mass.	Hupmobile	O'Neil Auto Co.
New Bedford, Mass.	Stearns	O'Neil Auto Co.
Norfolk, Va.	Kline	C. L. Young
Oakland, Cal.	Henderson	W. E. Hall M. C. Co.
Pawtucket, R. I.	Cole	Pawtucket Auto Co.
Philadelphia, Pa.	Kline	Kline Kar Sales Co.
Philadelphia, Pa.	Pope-Hartford	Wallace Auto Co.
Pittsburgh, Pa.	Kline	Kline Kar Motor Co.
Portland, Ore.	Flanders	Oregon M. Dis. Co.
Portland, Ore.	R-C-H	Becker Auto Co.
Quebec, Ont.	Speedwell	J. A. Landry
Reading, Pa.	Kline	D. B. Hoffer & Sons
Richmond, Va.	Kline	Foster M. C. Co.
San Francisco, Cal.	Kline	F. O. Renstrom & Co.
Santa Rosa, Cal.	R-C-H	E. M. Dates
Sausalito, Cal.	R-C-H	E. M. Dates
Scranton, Pa.	Kline	A. J. Schnell
Springfield, Mass.	Studebaker	Maynard Rubber Co.
St. Louis, Mo.	Little	Karkell M. C. Co.
Taunton, Mass.	Cole	Pawtucket Auto Co.
Wabash, Ind.	R-C-H	C. M. Story
Youngstown, O.	Kline	Thomas M. C. Co.

San Antonio Dealers Move—Birdsong & Patchernick, Franklin dealers in San Antonio, Tex., have just moved into a new salesroom and service station at 104 Avenue D, near the new Alamo Plaza.

Closes Season with Tour—The Automobile club of Mankato, Minn., closed the season with a tour of fifteen cars and fifty-five tourists through St. Peter, New Ulm, Madelis, Hanska and Lake Crystal, a one-day run.

Membership Campaign Successful—That the membership campaign now being waged by the Vancouver, B. C., Automobile Club is meeting with success, was the statement made recently by O. I. Fox, secretary of the association.

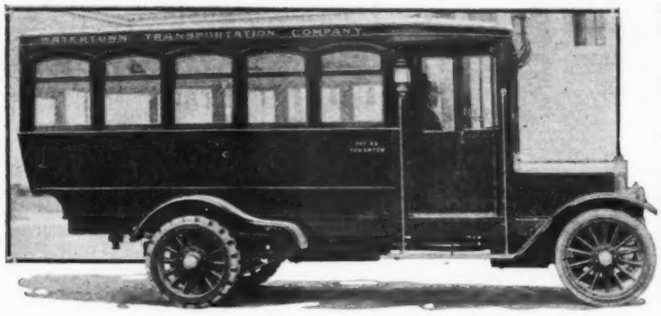
Ottawa's Show Plans—Next year's automobile show in Ottawa, Ont., which will be held in Howick Hall February 11 to 15, promises to be the largest ever held in Canada. Practically all the space in the hall has been taken by local and other dealers.

Ottowa Club Progressing—Seventy-two new members have been enrolled in the Ottawa, Ont., Motor Car Association during the past few weeks, according to the statement made at a meeting of that organization held recently. There are now about 550 automobile owners in the city.

Wireless on R-C-H—Highly interesting and exhaustive experiments involving for the first time the use of the automobile in wireless telephony have recently been made by E. C. Hanson of Los Angeles, Cal. One of the most recent experiments was a receipt on Lookout Mountain of a message sent over the ranges from Long Beach, 35 miles away. The car used was an R-C-H, current being supplied by the lighting storage with which the car is equipped.

Minneapolis Show Plans—The Minneapolis Automobile Trade Association, Minneapolis, Minn., has elected Walter R. Wilmot manager for the 1913 show in the Armory and annex and has executed a $5,000 contract with J. L. Hall company for the decorations. The space for the show has been doubled by the erection of an addition to the Armory which adds 27,000 square feet of space.

company at Cleveland for the purpose of studying the Baker electrics and of exchanging ideas on salesmanship and advertising



Atterbury truck fitted with a pay-as-you-enter car body, for use by the Watertown, N. Y., Transportation Company

Goodyear's Dayton Branch—The Goodyear Tire & Rubber Company has established a branch at Dayton, O., being located at 15 East Second street.

Alco Adds Shock Absorber—The American Locomotive Company, Providence, R. I., is to equip its cars with Truffault-Hartford shock-absorbers.

Turner with Wise—W. M. Turner has been engaged as manager of S. J. Wise & Company, Broadway and Fifty-eighth street, New York City.

Anderson Company Moves—The main office of the Anderson Engine Company, Chicago, Ill., is now located at 140 South Dearborn street, that city.

Osborn Manager Speedwell—C. E. Osborn has succeeded Harry Croninger as Pacific Coast manager of the Speedwell Motor Car Company in San Francisco, Cal.

Springfield Dealers Organize—The Motor car dealers in Springfield, Mass., got together last week and formed the Springfield Automobile Dealers Association.

Birmingham's Municipal Garage—A municipal garage may be the outcome of the Birmingham, Ala., controversy in regard to parking automobiles along the curbs.

Sweeney Kline Advertising Manager—C. E. Sweeney has been appointed advertising manager for the Kline Motor Car Corporation, York, Pa., and Richmond, Va. He succeeds W. P. Sieg.

Savannah's Mail Collector—An automobile is to be used in Savannah, Ga., for the collection of mail. The mail department has made an additional appropriation of $720 a year for the maintenance of the car.

Sturdy Adds Sta-Rite Line—The Sturdy Manufacturing Company, Chicago, Ill., has taken over the Sta-Rite line of ignition plugs, due to the failure of the R. E. Hardy Company, who has manufactured these plugs since 1900.

Daniels Moves Office—Smalley Daniels, operating as manufacturers' sales representative with main office for several years at Boston, Mass., has moved his main office to Detroit, Mich., and will make Boston a branch instead.

Franklin Company Moves—The Franklin Auto Company, Baltimore, Md., A. J. Miller, manager, will move to a larger home at 1919 North Charles street after November 1. The new location is now occupied by the D. C. Walker Auto Company.

Citizens After Speeders—To prevent speeding within the City limits a vigilance committee has been formed by citizens of Birmingham, Ala. Members of the committee will so arrange their hours that several watchers will be on duty night and day.

Replace Old Buses—Within the next few weeks the motor buses operated by the Metropolitan Coach Company on Sixteenth and other streets in Washington, D. C., will be replaced with new machines. An order will be placed for half a dozen new buses.

Road Tax Lower—In Los Angeles County, Cal., the tax for road work last year was 60 cents on every $1,000 of assessed property valuation. This year it is 50 cents, which will give the highway commission about $700,000 to expend on the roads of that county.

Baltimore Goodyear Moves—The Baltimore, Md., branch of the Goodyear Tire and Rubber Company will move into its new home at Cathedral and Preston streets within a few weeks. With the exception of a few finishing touches this new structure is practically completed.

Car's Novel Use—Elmer Sherman, San Francisco, Cal., has found a new use for his automobile. He was installing miles of heavy cable and the work was progressing slowly with two teams. Sherman used his Regal car as a wire stretcher and it took only 2 hours to finish the job.

Opens Service Station—The E. V. Stratton Company of Albany, N. Y., has opened a service building at 391 Hudson avenue for Everitt cars and Flanders sixes and electrics. A general repair shop for all makes of cars will also be conducted. Ezra Mickel will be in charge.

Unintelligent Road Improvement—Summing up the results of the Good Roads Convention, which was attended by more than 1,000 delegates representing every county in Alabama, it can be said that the keynote of the meeting was a warning against unintelligent road improvement.

Club Outlives Usefulness—A committee of five members of the Automobile Club of Washington, Washington, D. C., has been appointed by President Harrington Mills to consider the advisability of dissolving the organization, selling the club's country home and the formation of a new organization.

Holyoke Wants Motors—A committee of the Holyoke, Mass., Board of Aldermen, visited the Knox plant at Springfield, Mass., last week to inspect the motor apparatus that company makes as Holyoke intends to do away with some of its horse-drawn fire equipment and replace it with automobile engines and chemical wagons.

Drives His Own Machine—Chief Pomphret of the Chicopee, Mass., fire department recently bought a motor car in which to go to fires, and the Board of Aldermen, having refused to make an appropriation for a fireman to act as driver the chief has had the car placed in special quarters near his home and he will act as his own chauffeur.

Purchases Garage Stock—The Co-operative Auto Sales Company, a $100,000 corporation which was recently organized by Spokane, Wash., capitalists to carry on a wholesale and retail automobile and supply business on a co-operative plan, has purchased the entire issue of stock of the Regal Garage Company also of Spokane, at its par value of $10,000.

Washington's Show—The chances for a motor car show in Washington, D. C., are slight. The chief obstacle is the lack of a building of sufficient capacity to house the exhibits. Convention Hall, where the previous shows have been held, is the only available building, but there is some question about filling it with cars, many dealers believing it unsafe to use it for show purposes again.

Automobile Incorporations

AUTOMOBILES AND PARTS

AUSTIN, TEX.—Oakland Motor Company; capital, $10,000; to sell automobiles. Incorporator: T. B. Cochran.

BENTON, ILL.—Benton Motor Car Company; capital, $65,000; to manufacture automobiles and accessories. Incorporators: Harry Stotlar, W. S. Cantrell, A. H. Fraunfelder.

BOSTON, MASS.—Pope-Hartford Company; capital, $100,000; to manufacture and deal in automobiles. Incorporators: G. L. Dodd, C. W. Cousens, F. H. Lucas.

CLEBURNE, TEX.—Cleburne Motor Car Manufacturing Company; capital $10,000; to manufacture automobiles. Incorporators: H. E. Luck, G. A. McClung, O. L. Bishop.

COLUMBUS, O.—Columbus Auto Parts Company; capital, $25,000; to manufacture automobile parts. Incorporators: Reynold E. Klages, Charles H. Krag, Corinne Krag Klages, John J. Stoddard, Walter D. McKinney.

ELIZABETH, N. J.—Excelsior Automobile Company; capital, $50,000; to do a general automobile business. Incorporators: P. H. McCann, H. St. V. deRaismes, Peter Kern, Maurice Spewak.

GUELPH, ONT.—C. Kloepfer, Ltd.; capital, $250,000; to manufacture automobiles. Incorporators: C. Kloepfer, Edward Halloran, George A. Scott.

HAVERHILL, MASS.—Rambler Motor Car Company; capital, $10,000. Incorporators: J. P. Mollay, G. A. Burnham, C. S. Goodwin.

MORGANTOWN, W. VA.—City Automobile Company; capital, $4,800; to manufacture automobiles. Incorporators: J. Leonard Gates, S. S. Dearing, N. B. Yost, Margaret Smith, Cora B. Dearing.

NASHVILLE, TENN.—Jackson Motor Car Company; capital, $5,000; to deal in automobiles. Incorporators: H. C. Gillespie, D. D. Canfield, E. L. Bonne, W. H. Weakley, W. C. Sanefeur.

NEWARK, N. J.—American Auto Radiator Works; capital, $25,000; to manufacture automobile radiators. Incorporators: M. Steiner, S. Goldstein, A. Marcus.

HOUSTON, TEX.—Cole Motor Car Company; capital, $12,500; to deal in automobiles. Incorporators: J. J. Settegast, Jr.; A. J. Binz, F. H. Buelow, David F. Burks.

NEWARK, N. J.—Lippard-Stewart Sales Company; capital, $50,000; to deal in automobiles. Incorporators: Benjamin P. Burton, Benjamin B. Burton, Robert C. Bennett.

NEWARK, N. J.—Continental Garage Company; capital, $10,000; to do a general automobile business. Incorporators: Littleton Kirkpatrick, Robert C. German, Stuart A. Young.

NEW YORK CITY.—Distributing and Importing Company; capital, $100,000; to deal in automobiles and biplanes. Incorporators: Paul Lacroix, Harvey T. Andrews, Henry A. Miller.

NEW YORK CITY.—Faissole Auto Company; capital, $25,000; to deal in automobiles. Incorporators: Alexander Karlin, Lewis Lapides, Charles A. Faissole.

Ford's Philadelphia Plant—The Ford Company, Detroit, Mich., has established an assembly plant at Philadelphia, Pa.

Guide Lamp's Factory—The Guide Motor Lamp Company, Cleveland, O., is erecting a new factory building on Madison avenue, between 114th and 115th streets, in that city.

Hartford Company's Addition—The Hartford Suspension Company, Jersey City, N. J., is planning an eight-story reinforced concrete building, to be put up next to the Jersey City plant.

Portland Company Formed—The Beaver State Motor Company, Portland, Ore., was incorporated recently to manufacture motor trucks and motorcycles. A factory will be erected in the near future.

Marathon's Factory—The Marathon Tire & Rubber Company, Cuyahoga Falls, O., which is erecting a factory building, expects it to be completed and equipped to manufacture tires about November 1.

Cutting Enlarges Plant—The Cutting Motor Car Company, Jackson, Mich., has made arrangements for increasing the factory capacity. The new factory will probably be in course of erection by next spring.

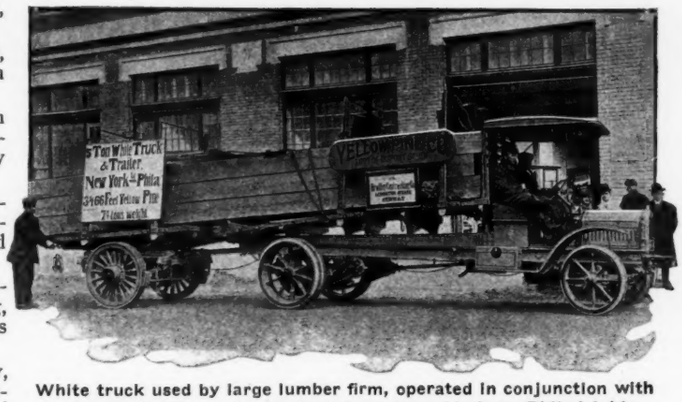
Premier's Addition—Two additions are to be made to the plant of the Premier Motor Manufacturing Company, Indianapolis, Ind. The buildings will be two stories high, one 40 feet by 140 feet and the other 48 feet by 140 feet.

Boon for Connersville—The Lexington Motor Car Company, Connersville, Ind., has agreed to furnish a tentatively-formed selling company with 1,000 six-cylinder automobiles in 1913. This order will keep the Lexington plant busy throughout the coming year.

Cincinnati Chauffeur's Club—The Ohio Chauffeur's Protective Association has been incorporated with headquarters at Cincinnati, O. Grover Bennett was elected president, Charles Eckert, vice-president, Roy Engelman, secretary, and George Puls, treasurer.

Editor Forms Company—Victor C. Parker, editor of *Modern Power*, Winnipeg, Man., has relinquished his position and removed to Detroit, Mich., where he has formed the Parker Motor Company, which will manufacture a rotary valve engine of which he is the inventor.

Ford Plant Manager—C. C. Hildebrand, formerly of the Chalmers Company, Detroit, Mich., will take charge of the Minneapolis, Minn., Ford plant, while H. C. Skinner, formerly manager of the Houston, Tex., branch of the Ford Motor Company, Detroit, Mich., will manage the assembling plant at Portland, Ore.



White truck used by large lumber firm, operated in conjunction with a trailer hauling a heavy load from New York to Philadelphia

Elmira's Fire Engine—The bid of the American LaFrance Fire Engine company, Elmira, N. Y., for the new hook and ladder motor truck for the fire department, has been accepted by the board of public safety. The machine will cost $6,000, will be equipped with a 70-horse-power engine, and will be thoroughly modern in every particular.

Leominster Chief Uses Motor—Chief Fred A. Russell of the Leominster, Mass., fire department recently bought a motor chassis on which he mounted a body supplied with a 32-gallon chemical tank, two hand fire extinguishers and a few other things needed in fire fighting and now he has a machine capable of doing good service in checking the spread of small fires.

Ford's Profits $7,000,000—To the Ford Motor Car Company, Detroit, Mich., belongs the credit of having made the largest 1912 net profits of any automobile concern in the country. Its production for the season to June 30 was at least 70,000 and probably nearer 75,000 cars which were sold at a net profit of slightly less than $100 per car, making the total profits amount to about $7,000,000.

Hadley Starts on Tour—W. K. Hadley, factory sales manager of the Lenox Motor Car Company of Boston, Mass., has started on a tour in the interests of the car and before he gets back he plans to cover about 10,000 miles and will visit New York, Philadelphia, Chicago, Indianapolis, Milwaukee, Denver, Los Angeles, Portland, San Francisco and other cities establishing agencies.

Visit Flanders Plant—In order to enable their distributors to inspect the new 1913 model of the six-cylinder, seven-passenger Flanders car the Flanders Motor Company, Detroit, Mich., will take a party of prominent dealers to Detroit in a special Pullman, so that they can inspect the new models and obtain a comprehensive idea of the magnitude of the new Flanders operations and the big scale on which the cars are now coming through the works.

Federal Supply Elects—The Federal Motor Supply Company of Cincinnati, O., has established its headquarters in the First National Bank Building. Plans have already been laid to open up branch houses in other cities throughout Ohio. The company will handle accessories and supplies for automobiles and trucks. George Platt, was elected president, Fred Beroldt, vice-president, Jesse Wozzencraft, secretary, Emil Schmidt, treasurer.

McNab Goes to Marion—The announcement is made by the Marion Motor Car Company, Indianapolis, Ind., that M. D. McNab, of Chicago, Ill., who until recently has been general manager of the United Motor Company, Chicago, has resigned that position to accept the vice-presidency of the Marion Company. In addition to filling this office Mr. McNab also will be director of sales. He will make his headquarters in Indianapolis.

From Agency to Branch—A change was made last week in the handling of the Chevrolet and Little cars in Boston, Mass., which had been taken on by the F. J. Tyler Corporation as an agency. The Republic Motor Car Company has been organized as a Massachusetts corporation with headquarters in the Motor Mart, Park square. The F. J. Tyler Corporation has moved next door where it will continue to handle the Columbus electric and later take on some other gasoline cars. W. C. Sills is in charge of the Republic company's branch.

Automobile Incorporations

NORTH TONAWANDA, N. Y.—Twin City Company; capital, $5,000; to deal in automobiles. Incorporators: W. A. Arenz, R. Leroy Herschell, F. J. Wallenberg.

ROCKFORD, ILL.—Rockford Motor Truck Company; capital, $10,000; to manufacture automobiles. Incorporators: P. A. Peterson, Levin Faust, John Ledin.

GARAGES AND ACCESSORIES

BUFFALO, N. Y.—Up-To-Date Auto Body and Specialty Company; capital, $2,500; to manufacture automobile bodies. Incorporators: Ludwig Dreyer, Emma H. Dreyer, G. P. Askin.

COLUMBUS, O.—Independent Motor Inspection Company; capital, $10,000. Incorporator: V. A. Troxell.

JACKSONVILLE, FLA.—Atkinson Tire & Supply Company; capital, $25,000; to carry on an accessory business. Incorporators: J. D. Cary, Lucien H. Boogs.

NEWARK, N. J.—Tri-Unit Electrical Company; capital, $100,000; to deal in automobile accessories. Incorporators: J. B. Stobaeus, Jr., B. W. Mathews, Wm. C. Stobaeus.

NEW YORK CITY.—Bryant Auto Painting Company; capital, $2,000; to paint automobiles. Incorporators: A. Berkowitz, Benjamin Davis, P. Ostruk.

NEW YORK CITY.—Atlas Tire Company; capital, $10,000; to manufacture automobile tires. Incorporators: K. W. Morrison, R. D. Placak, F. F. Nichols.

NEW YORK CITY.—Snowden Rubber Company; capital, $1,000; to manufacture tires. Incorporators: W. T. Snowden, E. J. Landgraff, A. Bidney Galitzka.

RICHMOND, VA.—Automobile Lighting Corporations of America; capital, $1,500,000; to manufacture a lighting device for automobiles. Incorporators: W. J. Simpson, Wailes Hank, A. D. Newcomb.

RICHMOND, VA.—National Automobile Top Company; capital, $15,000; to manufacture automobile tops. Incorporators: G. W. B. Crawford, R. V. Merchant, E. R. B. Crawford.

ST. MATTHEWS, S. C.—Calhoun Garage; capital, $3,000; to do a general garage business. Incorporators: C. H. Culler, N. E. Salley, J. M. Salley.

YOAKUM, TEX.—Automobile & Garage Company; capital, $20,000; to do a general garage business. Incorporators: F. A. Mason, J. Lyon, D. J. Shall.

CHANGES OF NAME AND CAPITAL

DETROIT, MICH.—Chalmers Motor Company; increase of capital from $3,000,000 to $5,000,000.

INDIANAPOLIS, IND.—Motor Car Manufacturing Company; increase of capital from $75,000 to $150,000.

MIDDLETOWN, O.—Crescent Motor Truck Company; increase of capital to $100,000.

Fig. 1—Loosening the locking ring Fig. 2—Removing the ring Fig. 3—The ring removed

Houk Q. D. Rim for American Wire Wheels

Rudge-Whitworth Type of Wire Wheel for Automobiles To Be Manufactured With Special Quick Detachable Rim for the American Trade in The Plant of the Standard Roller Bearing Company

THERE are strong indications that the long-predicted advent of the wire wheel into the automobile practice of America is to be fully materialized during the coming season of 1913.

The superiority of this type of wheel over the wooden artillery wheel has been amply demonstrated in both tests and actual practice on the road during the last 4 years. The most important of these tests was a series of destruction tests to determine the comparative strengths of the most commonly used kinds of wheels, carried out by the Rudge-Whitworth Company, of Coventry, England, the results of which were published a few months ago in THE AUTOMOBILE. Wire wheels have shown themselves to be stronger, lighter, more economical on tires and more flexible than wood wheels. Why, then, this tardy adoption of their merits in this country? Various reasons have been put forward, perhaps the most important being that as ordinarily made for the European market, wire wheels are provided with clincher type rims only, requiring tires with extensible beads, and this style of tire is becoming less easily procurable in the United States since the great advantages of the detachable rim were realized. In all probability the tire with inextensible edges for detachable rims will soon become the rule.

The George W. Houk Company, Philadelphia, Pa., has secured the American rights for the Rudge-Whitworth wire wheel and will combine with it the Sangster-Houk patent Q. D. rim.

The detachable portion of the Houk rim consists of a single split clinch ring, remarkable in that it is entirely free from bolts, nuts or clips of any kind. Its simplicity, in fact, renders a description other than that afforded by the illustrations almost unnecessary. As shown at A in the section, Fig. 4, the ring is stamped from the same stock as the rim proper and its attachment and detachment are as simple as its construction. The views, Figs. 1, 2 and 3, show the operations of removing the clinch ring. A special lever tool, used for this purpose, is shown with its method of application in the sketches Figs. 7 and 8. In removing, it is only necessary to start the ring from its seating at a point a few inches from the split end, as shown in Fig. 7, insert the small wedge-piece W, supplied with the tool, and after prying the raised end outwards over the top of the wedge with the handle of the tool, withdraw the ring by hand. To replace

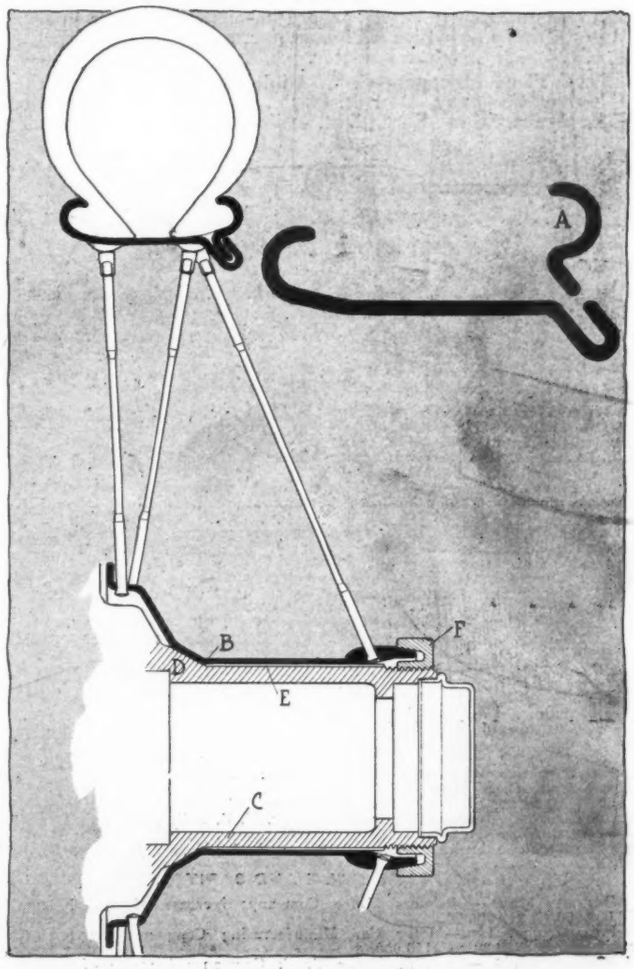


Fig. 4—Section through Rudge-Whitworth wheel and Houk rim

the clinch ring one end is first inserted in the groove, and the ring then worked in by hand around the rim as far as possible, the tool being required only to spring in a short length at the end.

The wheel itself, which will be turned out in all details exactly as the Rudge-Whitworth Company's product in England, will, in fact, be interchangeable with it, is of the triple-spoke order. A section is shown in Fig. 4.

It consists of a stamped shell hub B with a coned inner end to which the spokes are attached. This hub slides over an inner hub C mounted on ball bearings and provided with a flange D to take the coned surface of the wheel hub which is forced up against this flange by a single lock nut. The drive is transmitted through serrations E cut on the inner surface of the wheel hub and the corresponding outer surface of the inner hub. Great care is taken when cutting these longitudinal serrations to insure accurate alignment so that the wheel can be slipped on in any position with equal ease and fit.

When the R. W. detachable wheel was first introduced in 1909 it was held in place on the hub by the use of a special lock-nut with a double ratchet and pawl, one hand-operated and the other automatic. This device was absolutely fool-proof and has given perfect satisfaction so far as its action was concerned, but last year, after much experimenting, the makers replaced this device by the much simpler lock-nut shown at F, Fig. 6. This new nut has no second lock-nut, pin or other check, and yet once screwed up to the hub it remains automatically tight. Not only that, but if through carelessness or other cause the nut is not screwed home it will proceed to tighten itself as soon as the automobile is put into operation.

Reference to Fig. 6 will help to elucidate this peculiar action. Suppose the nut with its internally coned bearing surface is mounted on the hub but has not been screwed up tightly. It follows then, owing to the slight play of the wheel hub on the inner hub and the weight of the car on the axle, that the coned surfaces of wheel hub B and lock-nut F will meet only at a point, as shown at P. In other words, there will be a very slight degree of eccentricity existing between the two members, and as the situation of this contact point remains stationary, although the wheel is turning, it follows that a contact path is being mapped out on the inner circumferences of hub end and lock-nut. But, owing to the eccentricity, these circumferential paths are not of equal length and the outer, that of the nut, being the greater, there will be set up a differential creep betwen them, the nut lagging behind the wheel and so tightening itself up. It should be understood that the screw-thread for the wheels on the left side of the car is right-hand, while that for the right side wheels is left-hand. There is also a similar action, though of a lesser degree, taking place at the same time between the nut and the thread on which it is screwed. As the eccentricity of the various members decreases the action ceases so that finally the nut is right home and the wheel truly concentric on the hub.

Actual experiment has proved that the nut is sufficiently tight to resist the reversing efforts brought about by driving the automobile backwards for all ordinary distances.

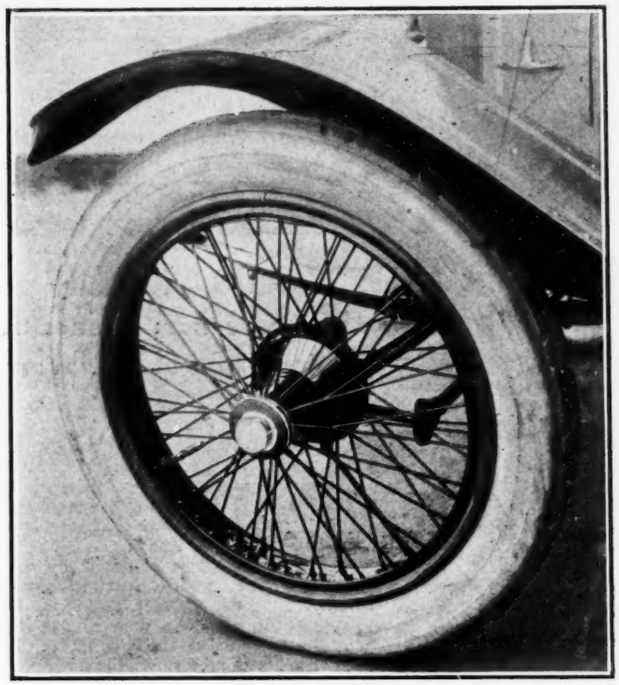


Fig. 5—American Rudge-Whitworth wire wheel with Houk rim

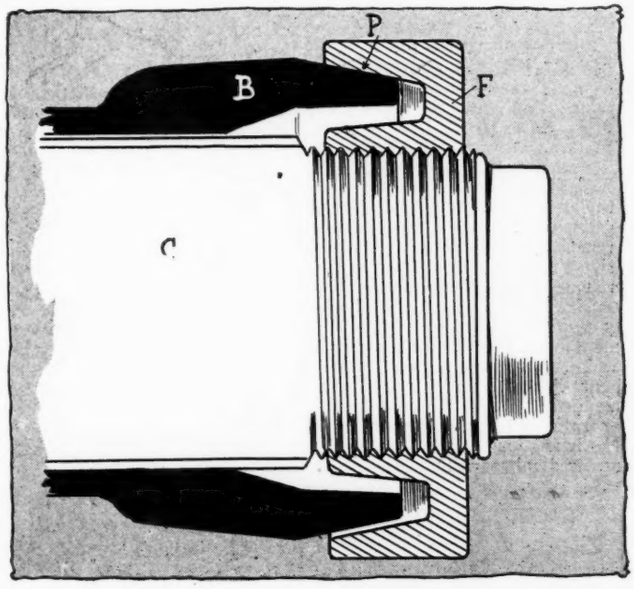


Fig. 6—Section of latest Rudge-Whitworth locking device

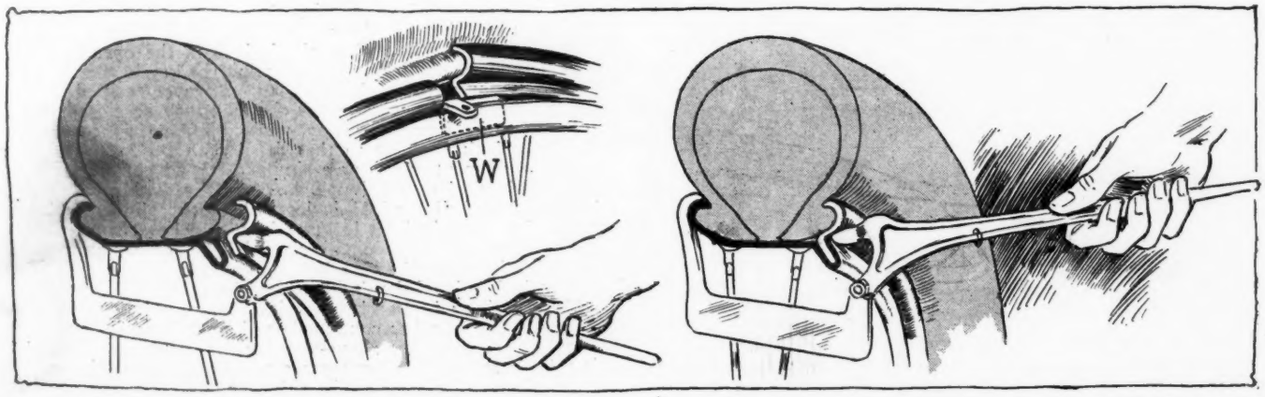


Fig. 7—Detail removing the Houk rim. Tool used for removing the locking ring. Fig. 8—Same tool inserting the ring

Reliance Ratchet Horn; Universally Adaptable Fuel Gauge; Gasolock; Kerosene Spray Engine Cleaner; Mixer for Starting; Landophone for Closed Cars; Portable Recording Clock for Watchmen

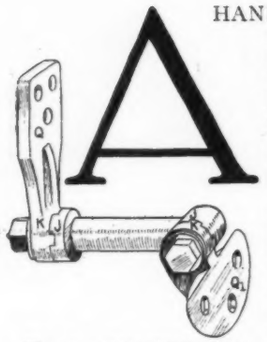


Fig. 1— Attaching piece for Reliance horn

A HAND-operated horn in which the signaling sound is produced by the intermittent contact of a ratchet wheel with a steel button secured to the center of a steel diaphragm is the latest addition to this line of instruments, being manufactured by the D. S. P. Automobile Specialty Company, 327 Adams street, Brooklyn, N. Y. The horn is shown in Fig. 2 and is dimensioned as follows: length, 9 inches; diameter of diaphragm, 5 inches; diameter of screened front of the horn, 6.5 inches; width of the squared middle portion, 2.5 inches. The outside of the horn requiring no explanation, we will proceed to deal with the description of the mechanism by means of which the signaling sound is generated. This mechanism consists of a train of gears made irreversible by the use of a pawl engaging one of them. These gears, of which there are five, are mounted on three shafts S1, S2, S3 in Fig. 3. The operation of the horn is as follows: A handle H, Fig. 3, is secured to the shaft S1 which carries gears A and B, and when this handle is turned toward the right, referring to Fig. 3, the gear B and with it the gear A is turned in that direction. As soon as the handle H has reached the limit of its movement which is determined by the shape of the casing of the horn the pressure on the handle may be released whereupon it returns to its original position due to the tension of the spring S4 which draws forward the pawl R5 engaging the gear or ratchet B. The transmission of the movement of the shaft S1 over the shaft S2 to S3 which carries the ratchet W is obvious upon referring to Fig. 3. Excepting gears A and B which are loose on S1, all gears are keyed to their respective shafts and are continually in engagement so that the operation of the horn is positive and the pressure on the handle H always causes the ratchet W to strike against the bottom D1 under diaphragm D.

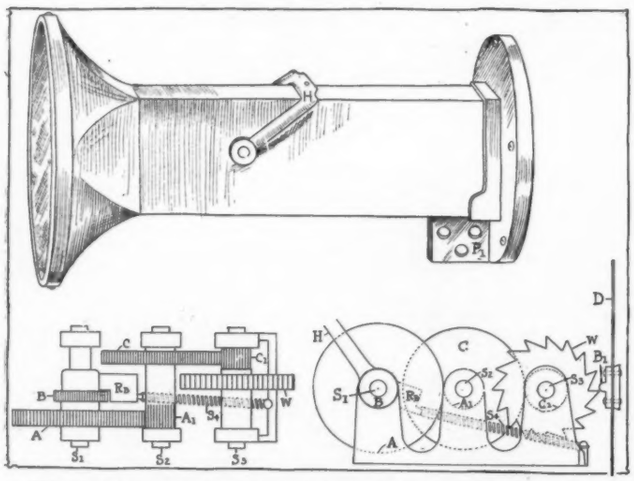


Fig. 2—Outside view of Reliance hand-operated, ratchet-and-button horn. Fig. 3—Schematic view of gears by means of which horn is operated

The horn is secured for any suitable portion of the body and in reach of the driver by means of an attachment piece shown in Fig. 1. This member is of an ingenious construction, giving the service of a ball-and-socket joint in combination with positive locking of its parts. The attachment consists of three pieces, one of which is formed as a bolt and is fitted with jaws J, while the other two are plates, each punched with three holes and engaging jaws J by means of jaws K. The jaws are held in engagement through the office of nuts. The piece Q is bolted with a part P1 of the horn casing, and the part Q1 is secured to the body of the car.

Imperial Gasoline Gauge

Automobilists are more and more coming to realize the value of a dash-attached gauge which always tells at a glance the quantity of fuel carried in the tank at the moment. An addition to the line of devices which have been designed as tell-tales is the Imperial indicator, made by the Imperial Fluid Gauge Company, Canton, O. This device may be used for gravity or pressure feed systems, and consists of a glass tube carried in high-polished brass. Fig. 6 shows the system as used for gravity feed, in which the interior of the gauge is simply brought into communication with the fuel line by means of two couplings and a piece of tubing. In case the gauge is desired to serve in connection with a pressure-feed system, the type shown in Fig. 4 is used, comprising in addition to the indicator tube, a well under the same which extends below the floor line and contains a cylindrical float carrying a wire with an indicator head. To the top of the indicator tube a compression connection is made to a return air line, and by this expedient the height of the gasoline in the gauge above the well is always the same as the height of the fuel in the tank. When ordering the outfit, it is necessary to inform the maker of dimensions of tank and feed pipe, shape of tank, class of feed used, etc., to obtain correct graduation.

Gasolock for Dash Control

To prevent the use of the car without the permission of its owner and to prevent leakage in the gasoline line at the point of the fuel cock, the Auto Lock and Specialty Company, 412 Scherer Building, Detroit, Mich., has constructed the Gasolock, Figs. 7 and 10. This device is attached to the dashboard and consists substantially of six parts, the Yale pin-tumbler lock cylinder, the ball head containing it, the socket for attaching the ball head to the dashboard, the cock which opens or interrupts the gasoline flow, the mechanical connection between cock and Yale lock and the reach or guard tubes enclosing the same.

The lock cylinder contains a double set of tumblers permitting of withdrawing the key when the lock is in the open position; the latter may be obtained upon inserting the key in the lock and turning the winged thumb-button T to the proper position, whereupon the key may be withdrawn; the lock may be closed by returning T to its former position, without using the key. In the end of the lock opposite to that fitted with the button T is a bevel gear segment engaging a similar gear which is carried by to the mechanical connection inclosed in the double telescoping tubes R. The ball head H incloses the lock cylinder which is held in place therein by a bayonet joint and kept from rotating through the use of a retaining screw. The socket which contains the ball head is formed with a boss on its back side which is fitted into a 75-inch hole of the dashboard. The attachment of the ball head is such that vibration between it and the socket is impossible. The connecting member contained in the reach tubes T consists of a tube T carrying the above-mentioned bevel gear; the end of this tube is squared and engages a rod of square section which has its other end pinned to the valve or cock plug contained in the casing C. The cock is formed with a bearing in its casing

and its stem is surrounded by packing which keeps it tightly in place and guards it against leakage of the gasoline into the reach tubes. The cock plug is designed with an annular groove extending through an arc of 90 degrees, which is engaged by a stop screw, thereby limiting its angular movement to such an extent. The upper middle portion of the cock plug is formed cylindrically and seats in a suitably shaped portion of the casing C, being pressed down by a spring between it and the flanged portion of the casing.

National Primer and Mixer

A device which facilitates starting by thoroughly mixing the priming fuel with air before it is admitted to the cylinders is made by the National Manufacturing Company, Kalamazoo, Mich., The National Compound Mixer and Primer, Fig. 11, consists of two cylinders connected by a valve, one of which serves as a small fuel reservoir and the other as a mixer, being fitted with a device which mixes a certain amount of air when gasoline passes through the cylinder. In installing the mixer and primer, the inlet manifold is tapped with an .34375-inch drill and a 1-8-inch standard pipe tap, which permits of connecting the manifold to the outlet at the bottom of the mixing cylinder. The valves or cocks V and VI, regulate the passage of fuel from the priming to the mixing cylinder and from the latter to the inlet manifold, respectively. The device is attached to the dashboard of the car, which is drilled to permit of passing the tubing through it.

Romort Quick Engine Cleaner

The Romort Valve Company, 231 Worcester Building, Portland, Ore., manufactures a handy device which serves for rapidly cleaning the outside of the motor, being shown in Fig. 9. The cleaner is designed for use in garages, repair shops, etc., being operated by compressed air which is introduced by connecting the apparatus to an air line used in such establishment. The device consists of a cylinder shaped with a funnel-and-spout end and a nozzle, having an overall length of 20.5 inches and a diameter of 4 inches. The fluid which is used for cleaning and for which purpose kerosene is recommended, is filled in through a filler near the wide end of the funnel; while the compressed air enters through the tube T and its flow is regulated by a needle valve in V. An inclosed passageway for the compressed air traverses the interior of the cleaner, ending in an aperture near the end N of the nozzle where the air picks up the fluid which is sprayed against the motor to be cleaned. The knurled rod V enclosing the regulating valve is well packed to prevent leaks of air and the same holds of the packing nut P,, which is tightened on the compressed air tube to hold it securely in place.

Brown Automobile Telephone

One of the most recent novelties that have appeared in the British accessory field is the Landophone, made by Brown Brother, Limited, 22-34 Great Eastern street, London, E. C. This device is a specially designed telephone through which the passengers seated in a limousine or landaulet may give orders to the driver and which transmits messages loudly and clearly despite the noise of the street. The 'phone is constructed on the telephone principle, but in addition to a speaking tube, coil box and 4-volt battery comprises a receiver which is fitted with a megaphone concentrating and strengthening the sound, after it has been transmitted from the interior of the car and has been reproduced by the diaphragm of the receiver.

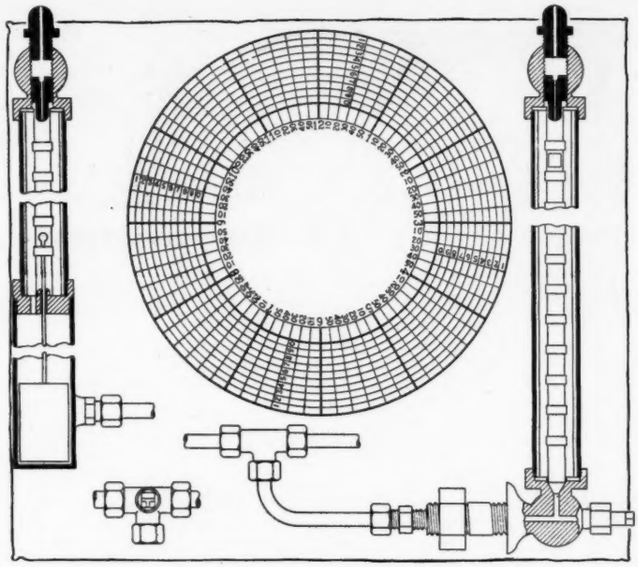


Fig. 4—Imperial gauge for pressure feed. Fig. 5—Dial of Eco portable watchman's clock. Fig. 6—Design of Imperial gauge for gravity feed

Eco Portable Watchman's Clock

The Eco Magneto Clock Company, 234 Congress street, Boston, Mass., manufactures a clock for watchmen who periodically have to inspect a number of given places in a factory or similar large establishment. This device consists of a clockwork which rotates with a paper dial as shown in Fig. 5, and from ten to thirty tumblers carrying punching pins, which are operated by Yale keys chained to the several places to be inspected. The number of the inspecting station is given by number on the circle punched, while the radius along which the dial is punched indicates the time of recording. The whole mechanism is enclosed in a leather bag fitted with straps, as seen in Fig. 8.

Correct Address of Cleaner—In the description of the Auto Vacuum Cleaner which appeared in this column, page 869, of THE AUTOMOBILE of October 24, the address of the maker was given as 253 West Twenty-third street, New York City. This address being wrong we herewith give the right address which is 253 Twenty-third street, Milwaukee, Wis.

Fig. 7—Outside of Gasolock device. Fig. 8—Eco portable watchman's clock. Fig. 9—Romort engine cleaner. Fig. 10—Gasolock installed on dashboard. Fig. 11—National primer and mixer.

ROTARY Valve Design—Comprising a cylinder valve construction, with means for insuring tightness between individual passages.

This patent refers to a valve construction for internal-combustion engines, as illustrated in Fig. 1. The valve V is a rotary cylinder journaled in a cylindrical bed B, the interior of which is connected by ports P to the working cylinders of the engine. The valve itself is composed of an outer cylinder O and an inner one I, each of which is formed with a series of ports designed to register in turn with those in the valve bed, thereby providing passages between the manifolds and the cylinders. To prevent leakage of gas from one port to the other, an annular rib R is formed between each two neighboring ports; this rib extending into an annular groove in the inside surface of the valve bed.

No. 1,041,957—to George Bradford Brown, Warkworth, Ont. Granted October 22, 1912; filed May 2, 1912.

Dirigible Headlight Support—Describing a method of carrying the headlights which are operable to turn in parallel with the front wheels.

A headlight carrying design for lamps which turn when the front wheels of a car are turned to either side is shown in Fig. 2. This construction comprises a standard S for each lamp, a section S1 formed with a socket and fixed upon a post, and a second section S2 which has a complementary stem rotatable in the socket. Between stem and socket is anti-friction ball, and the stem is formed with an annular groove engaged by a screw which holds the sections S1 and S2 against separation.

No. 1,041,902—to Louis C. Thoeming, Benjamin H. Thoeming and Edwin A. Anderson, Newcastle, Wyo. Granted October 22, 1912; filed May 7, 1912.

Automobile Jack—Being of wedge design and lockable by means of a rack.

The subject-matter of this patent, shown in Fig. 3, is an automobile jack which is composed of a base frame F and a top frame T designed to be movable longitudinally in relation to the base frame. The frame T is normally arranged below the axle of a vehicle which is to be elevated through the use of the jack, and wedge blocks are secured to the top frame in such a position that they fit between it and the axles of the car when the jack is first applied. The wedge blocks W engage inclined track surfaces between top frame and car axles, and means are provided for moving T intermittently forward, for locking it in any suitable position, and means M for rendering the locking means inoperative. As the lower wedge blocks are attached to the base frame B and the upper to the top frame T, the vertical lever engaging a rack on the extension of the base frame permits of easily operating the wedges and lifting the car.

No. 1,042,154—to Herbert W. Seely, Selgman, Ariz. Granted October 22, 1912; filed March 30, 1912.

Shock Absorbing Device—Comprising an auxiliary spring fitted in a suitable manner between the inner surfaces of the elliptical spring leaves.

Fig. 4 illustrates the shock absorber construction which is described in this patent and which comprises, in combination with an elliptical automobile spring S and its bow-shaped members M provided with bracket carrying rollers R and an auxiliary, shock absorbing spring S1 which is disposed between the bow shaped members, one of its ends being fixed and the other traveling between rollers R.

No. 1,041,843—to Charles S. Moore, Danvers, Mass. Granted October 22, 1912; filed June 14, 1911.

Grip Wrench Construction—Comprising, in combination with the jaws of a wrench, means for holding the former in their relative positions when adjusted.

This patent refers to a wrench which consists of two members shaped with jaw ends and being pivotally connected to each other. Resilient means which are independent of the pivotal connection are provided for adjusting the relative position of the two members, and spring means serve for frictionally holding the wrench members in the adjusted positions.

No. 1,041,967—to William Cronk, Montour Falls, N. Y. Granted October 22, 1912; filed October 25, 1910.

Spring Wheel Tire—Comprising an inner and outer rim, between which coiled springs are located and which are braced in a suitable way.

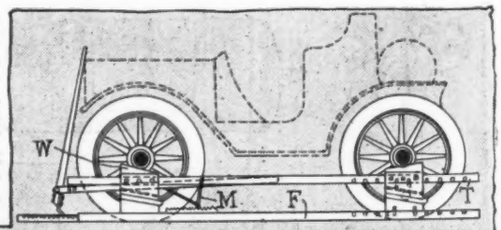
The subject matter of which patent is a spring wheel tire. The construction includes an inner and an outer rim, the latter being resilient and spaced from the former one, and coiled springs each of which has one end connected to the inner rim and the other to the outer one. A number of brace chains connect inner and outer rims respectively, and a number of resilient braces are arranged in oppositely disposed pairs. One end of each brace is rigidly held to the inner rim, while the opposite end is slidably secured to the outer rim. To the latter flexible skirt members are connected with bear over the side of the inner rim and are detachably connected to the same.

No. 1,041,829—to William B. Mallory, Hermosa, S. D. Granted October 22, 1912; filed March 12, 1910.

Automobile Carbureter—Comprising slidably hollow cylinders as valves for regulating the admission of mixture.

The carbureter described in this patent comprises a mixing chamber with inlet and outlet ports and two independently movable hollow valves which are arranged adjacent to each other and adapted to slide longitudinally within the mixing chamber to control inlet and outlet ports. Each valve member has an open end and contains a compression spring tending to bear against the mixing chamber through the open end of the hollow valve member.

No. 1,042,077 — to Clement Brown, Birmingham, Eng. Granted October 22, 1912; filed October 4, 1909.



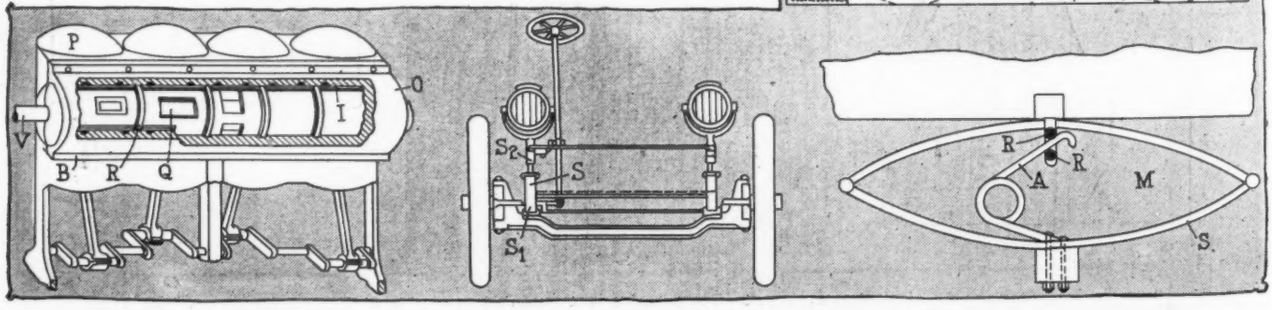


Fig. 1—Brown rotary valve. Fig. 2—Thoeming headlight support. Fig. 3—Seely jack. Fig. 4—Moore shock absorber